DVD-Video Recorder DVDR77/0x

Service
Service
Service

Service Manual

CLASS 1
LASER PRODUCT

DVD+ReWritable

Contents Page

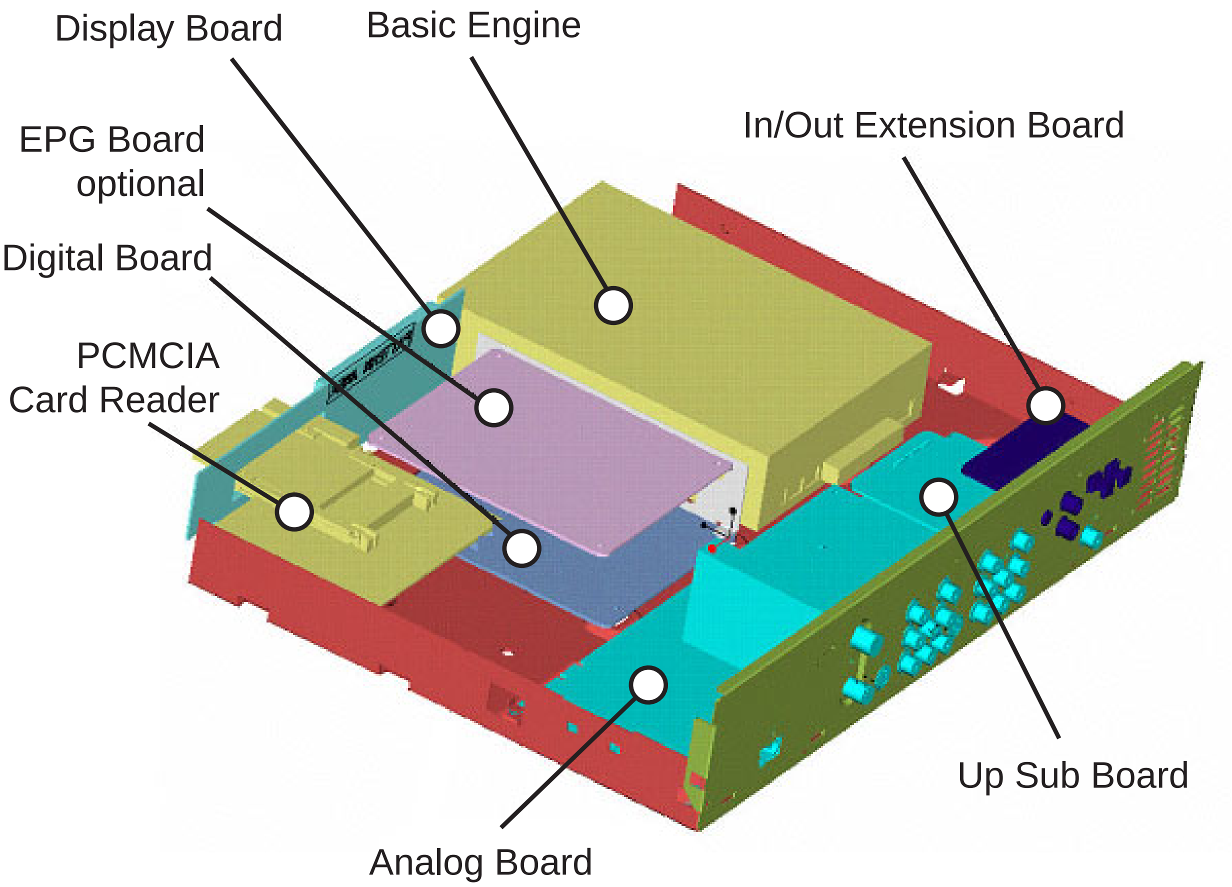
For the drive please refer to the service manual of the Basic Engine VAD8031, 3122 785 13680.

Published by GH 0393 Service PaCE Printed in the Netherlands Subject to modification EN 3122 785 13370

PHILIPS

1. Technical Specifications and Connection Facilities

1.1 PCB Locations



Remarks:

The EPG Board is not present in the DVDR77.

1.2 Diversity Matrix

Type	DVDR77/00 DVDR77/02
Digital Board (Chrysalis) 2.1	PCB ASSY CHRY 2.1_E4
Basic Engine AV3	VAD8031/01
I/O Extension Board IOE	PBAS IOE IST E2
UP Sub Board	PBA UP SUB IST E1
Analog-Board	PB AB ISTEP E1
Display Control	PCB ASSY DC1 IST E/N

1.3 General:

Mains voltage : 198V-276V
Mains frequency : 43 Hz - 63Hz
Power consumption mains : 28 W
Power consumption standby : < 7 W
Power consumption low power stand-by : < 3 W

1.4 RF Tuner

Test equipment:Fluke 54200 TV Signal generator
Test streams:PAL BG Philips Standard test pattern

1.4.1 System:

PAL B/G, PAL D/K, SECAM L/L’, PAL I

1.4.2 RF - Loop Through:

Frequency range : 45 MHz - 860 MHz
Gain: (ANT IN - ANT OUT) : -6 dB to 0dB

1.4.3 Radio Interference:

input voltage /3 tone method (+40 dB min) : no limit

1.4.4 Receiver:

PLL tuning with AFC for optimum reception
Frequency range: : 45.25 MHz - 857 MHz
Sensitivity at 40 dB S/N : ≥ 60dBµV at 75Ω (video unweighted)

1.4.5 Video Performance:

Channel 25 / 503,25 MHz,
Test pattern: PAL BG PHILIPS standard test pattern,
RF Level 74 dBV

Measured on SCART 1
Frequency response: 0 - 4.00 MHz +0-4dB
Group delay (0.1 MHz - 4.4 MHz) : 0 nsec ± 150nsec

1.4.6 Audio Performance:

Audio Performance Analogue - HiFi:

Frequency response at SCART 1 (L+R) output: 100 Hz - 12 kHz / 0± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal: FM: ≥ 50dB; AM ≥ 45dB, unweighted
Harmonic distortion (1 kHz, ± 25 kHz deviation): FM ≤ 1.5%; AM ≤ 2%

Audio Performance NICAM:

Frequency response at SCART 1(L+R) output: 40 Hz - 15 kHz 0 ± 3dB
S/N according to DIN 45405, 7, 1967 and PHILIPS standard test pattern video signal: ≥ 60 dB unweighted
Harmonic distortion (1 kHz): ≤ 0.5 %

1.4.7 Tuning

Automatic Search Tuning

scanning time without antenna : typ. 3 min. PAL
stop level (vision carrier) : ≥ 37dBμV
Maximum tuning error of a recalled program : ± 62.5 kHz
Maximum tuning error during operation : ± 100 kHz

Tuning Principle

automatic B,G, I, DK and L/L'detection
manual selection in "STORE" mode

1.5 Analogue Inputs

1.5.1 SCART 1 (Connected to TV)

Pin Signals:

1	- Audio R	1.8V RMS	○→
2	- Audio R		→○
3	- Audio L	1.8V RMS	○→
4	- Audio GND		⏚
5	- Blue/Chroma GND		⏚
6	- Audio L		→○
7	- Blue out/ Chroma in	0.7Vpp ± 0.1V into 75 Ohm (*)	▭→
8	- Function switch	<2V = TV >4.5V / <7V = asp. ratio 16:9 DVD >9.5V / <12V = asp. ratio 4:3 DVD	○→
9	- Green GND		⏚
10	- P50 control		▭→
11	- Green	0.7Vpp ± 0.1V into 75 Ohm (*)	
12	- Nc		
13	- Red/Chroma GND		⏚
14	- fast switch GND		⏚
15	- Red out/ Chroma out	0.7Vpp ± 0.1V into 75 Ohm (*) ± 3dB 0.3Vpp Chroma (burst)	▭→
16	- fast switch RGB/ CVBS	or Y <0.4V into 75 Ohm = CVBS >1V / <3V into 75 Ohm = RGB	○→
17	- Y/CVBS GND OUT		⏚
18	- Y/CVBS GND IN		⏚
19	- CVBS/Y	1Vpp ± 0.1V into 75 Ohm (*)	○→
20	- CVBS/Y		→▭
21	- Shield		⏚

1.5.2 SCART 2 (Connected to AUX)

Pin Signals:

1	-Audio R	1.8V RMS	○→
2	-Audio R		→○
3	-Audio L	1.8V RMS	○→
4	-Audio GND		⏚
5	-Blue/Chroma GND		⏚
6	-Audio L		→○
7	-Blue in/ Chroma out	± 3dB 0.3Vpp Chroma (burst)	▭→
8	-Function switch		→○
9	-Green GND		⏚
10	-P50 control		▭→
11	-Green		→▭
12	-Nc		
13	-Red/Chroma GND		⏚
14	-fast switch GND		⏚
15	-Red in/ Chroma in		→▭
16	-fast switch RGB/ CVBS or Y		→○
17	-CVBS GND OUT		⏚
18	-CVBS GND IN		⏚
19	-CVBS/Y/RGB sync	1Vpp ± 0.1V into 75 Ohm (*)	○→
20	-CVBS/Y		→▭
21	-Shield		⏚

(*) for 100% white

1.5.3 Audio/Video Front Input Connectors

Audio

Input voltage : 2 Vrms
Input impedance : >10kΩ

Video - Cinch

Input voltage : 1 Vpp ± 3dB
Input impedance : 75 Ω

Video - YC (Hosiden)

Input voltage Y : 1Vpp ± 3dB
Input impedance Y : 75 Ω
Input voltage C : burst 300 mVpp ± 3 dB
Input impedance C : 75 Ω

1.6 Video Performance

All outputs loaded with 75 Ohm
SNR measurements over full bandwidth without weighting.

1.6.1 SCART (RGB)

SNR : > -65 dB on all output
Bandwidth : 4.8 MHz ± 2dB

1.7 Audio Performance CD

1.7.1 Cinch Output Rear

Output voltage 2 channel mode	:	2Vrms ± 2dB
Channel unbalance (1kHz)	:	<1dB
Crosstalk 1kHz	:	>95dB
Crosstalk 20Hz-20kHz	:	>85dB
Frequency response 20Hz- 20kHz	:	±0.2dB max
Signal to noise ratio	:	>95 dB
Dynamic range 1kHz	:	>85dB
Dynamic range 20Hz-20kHz	:	>80dB
Distortion and noise 1kHz	:	>85dB
Distortion and noise 20Hz-20kHz	:	>75dB
Intermodulation distortion	:	>77dB
Mute	:	>95dB
Outband attenuation:	:	>40dB above 30kHz

1.7.2 Scart Audio

Output voltage 2 channel mode	:	1.6Vrms ± 2dB
Channel unbalance (1kHz)	:	<1dB
Crosstalk 1kHz	:	>85dB
Crosstalk 20Hz-20kHz	:	>70dB
Frequency response 20Hz- 20kHz	:	± 0.2dB max
Signal to noise ratio	:	>85 dB
Dynamic range 1kHz	:	>75dB
Dynamic range 20Hz-20kHz	:	>70dB
Distortion and noise 1kHz	:	>75dB
Distortion and noise 20Hz-20kHz	:	>65dB
Intermodulation distortion	:	>70dB
Mute (spin-up, pause, access)	:	>85dB
Outband attenuation:	:	>40dB above 25kHz

1.8 Digital Output

1.8.1 Coaxial

CDDA/ LPCM (incl MPEG1)	:	according IEC958
MPEG2, AC3 audio	:	according IEC1937
DTS	:	according IEC1937, amendment 1

1.9 Card Reader

IDE Interface ATA Card Reader
PC Card Standard Rev 8.0 Type I & II PCMCIA ATA Flash Memory Card Standard
Data transfer: 16.6MB/s max.
Support of all types of IDE Hard Disk Drives, Compact Flash Cards, Smart Media Cards / Smart Media ROM Cards, MMC Cards, SD Cards,

1.10 Digital Video Input (IEEE 1394)

1.10.1 Applicable Standards

Implementation according:
IEEE Std 1394-1995
IEC 61883 - Part 1
IEC 61883 - Part 2 SD-DVCR (02-01-1997)
Specification of consumer use digital VCR's using 6.3 mm magnetic tape - dec.1994
Mechanical connection according:
Annex A of 61883-1

1.11 P50 System Control

Via SCART pin nr 10

1.12 Dimensions and Weight

Height of feet	:	10mm
Apparatus tray closed	:	WxDxH :435 x 324.5 x 88cm
Apparatus tray open	:	WxDxH :435 x 366 x 88cm
Weight without packaging	:	app. 4 kg ± 0.5 kg
Weight in packaging	:	app. 6.5 kg

1.13 Laser Output Power & Wavelength

1.13.1 DVD

Output power during reading	:	0.8mW
Output power during writing	:	20mW
Wavelength	:	660nm

1.13.2 CD

Output power	:	0.3mW
Wavelength	:	780nm

2. Safety Information, General Notes

2.1 Description of the Production Number on the type plate

The type plate of the set contains a production number that consists of the following:

x	x														Site Code (Production center)
		x													BOM (Bill of Material) code
			x												Service version change code
				x	x	x	x								Production year/week code
								x	x	x	x	x	x		Serial number (6 digits)
V	N	1	A	0	3	4	2	1	2	3	4	5	6		Example code

2.1.1 The Site Code (Production center)

The site code consists of 2 letters and relates to the factory assembling and/or equipping the products. The site code letters valid for Consumer Electronics are stated in UAT-0477. The code is used to trace the production site of the model number,
e.g. VN...Szekesfehervar
KB...Hasselt
KT...SBI Electronics Shenzhen

2.1.2 BOM Code

The BOM code is used to link the model to the actual Bill Of Material used for assembly during set production. One set model can be made up of different standard designs / modules. This depends on the material availability in the production or the development progress of the successor modules. Different modules may be used during the same production period or changed back and forth from one week to the other.
BOM version 1 gets BOM code 1, BOM version 2 gets BOM code 2, etc. Allowed codes are 1-9, A-Z.

2.1.3 Service Version Change Code

The service version change code, which has to be recognizable for service and production departments, is used to indicate a production change that is considered as a major change affecting the “serviceability” of the product. A major change is occurring when a safety component is changed or when the servicer needs additional information to repair the set. E.g. when the software is changed or when an IC and its peripheral circuit are changed. Allowed characters are (A-Z, 0-9) to be used in the following sequence: A-Z followed by 0-9.

2.1.4 Production year/week code

Indicates the actual week of set assembly. Made up of the last two digits of year plus production week.

2.1.5 Serial number

The six digit serial numbers.

2.2 Safety Instructions

2.2.1 General Safety

Safety regulations require that during a repair:
- Connect the unit to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that after a repair, you must return the unit in its original condition. Pay, in particular, attention to the following points:
- Route the wires/cables correctly, and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the electrical DC resistance between the mains plug and the secondary side:
  1. Unplug the mains cord, and connect a wire between the two pins of the mains plug.
  2. Set the mains switch to the 'on' position (keep the mains cord unplugged!).
  3. Measure the resistance value between the mains plug and the front panel, controls, and chassis bottom.
  4. Repair or correct unit when the resistance measurement is less than 1 MΩ.
  5. Verify this, before you return the unit to the customer/ user (ref. UL-standard no. 1492).
  6. Switch the unit ‘off’, and remove the wire between the two pins of the mains plug.

2.2.2 Laser Safety

This unit employs a laser. Only qualified service personnel may remove the cover, or attempt to service this device (due to possible eye injury).

Laser Device Unit

Type : Semiconductor laser GaAlAs
Wavelength : 650 nm (DVD)
: 780 nm (VCD/CD)
Output Power : 20 mW (DVD+RW writing)
: 0.8 mW (DVD reading)
: 0.3 mW (VCD/CD reading)
Beam divergence : 60 degree

Figure 2-1

Note: Use of controls or adjustments or performance of procedure other than those specified herein, may result in hazardous radiation exposure. Avoid direct exposure to beam.

2.3 Warnings

2.3.1 General

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are at the same potential as the mass of the set by a wristband with resistance. Keep components and tools at this same potential.
  Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.

  - Wristband tester 4822 344 13999.
- Be careful during measurements in the live voltage section. The primary side of the power supply (pos. 1005), including the heatsink, carries live mains voltage when you connect the player to the mains (even when the player is 'off'!). It is possible to touch copper tracks and/or components in this unshielded primary area, when you service the player. Service personnel must take precautions to prevent touching this area or components in this area. A 'lightning stroke' and a stripe-marked printing on the printed wiring board, indicate the primary side of the power supply.
- Never replace modules, or components, while the unit is ‘on’.

2.3.2 Laser

- The use of optical instruments with this product, will increase eye hazard.
- Only qualified service personnel may remove the cover or attempt to service this device, due to possible eye injury.
- Repair handling should take place as much as possible with a disc loaded inside the player.
- Text below is placed inside the unit, on the laser cover shield:

CAUTION VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING
ADVARSEL SYNLIG OG USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
VARNING SYNLIG OCH OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD BETRAKTA EJ STRÅLEN
VARO! AVATT AESSA OLET ALTTIINA NÄKYVÄLLE JA NÄKYMÄTTÖMÄLLE LASER SÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN
VORSICHT SICHTBARE UND UNSICHTBARE LASERSTRAHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETSEN
DANGER VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID DIRECT EXPOSURE TO BEAM
ATTENTION RAYONNEMENT LASER VISIBLE ET INVISIBLE EN CAS D'OUVERTURE EXPOSITION DANGEREUSE AU FAISCEAU

Figure 2-2

2.3.3 Notes

Dolby

Manufactered under licence from Dolby Laboratories. “Dolby”, “Pro Logic” and the double-D symbol are trademarks of Dolby Laboratories. Confidential Unpublished Works.
©1992-1997 Dolby Laboratories, Inc. All rights reserved.

DOLBY SURROUND
PRO • LOGIC

Figure 2-3

Trusurround

TRUSURROUND, **SRS** and symbol (fig 2-4) are trademarks of SRS Labs, Inc. TRUSURROUND technology is manufactured under licence frm SRS labs, Inc.

Figure 2-4

Video Plus

“Video Plus+” and “PlusCode” are registered trademarks of the Gemstar Development Corporation. The “Video Plus+” system is manufactored under licence from the Gemstar Development Corporation.

VIDEOPlus+®

Figure 2-5

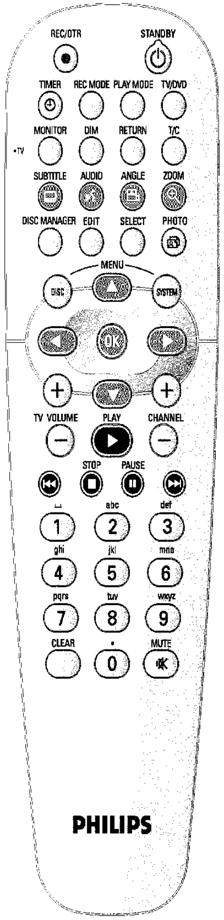
Macrovision

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners.
Use of this copyright protection technology must be autorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

3. Directions For Use

ENGLISH

The remote control



REC/OTR ●	**Record**: Record the current TV channel
STANDBY ⏻	**Switch on or off**: To switch set on or off, interrupt menu function, interrupt a programmed recording (TIMER)
TIMER ⊕	**TIMER**: To make a TIMER programming with/without ShowView® or to alter or clear a programmed TIMER
REC MODE	**Record type (Picture quality)**: To select the maximum possible record time
PLAY MODE	**Playback type**: Choose between repeat, shuffle play and intro-scan
TV/DVD	**TV/DVD switch**: Switches the scart socket **EXT 2 AUX-I/O** of the DVD recorder directly to the TV set. This lets you watch the picture from any unit connected to this scart socket (set-top box', video recorder or satellite receiver) and at the same time record from another source. If you have not connected a device to the **EXT 2 AUX-I/O** socket or the device is switched off, you can use this button to switch between TV reception and the signal of the DVD recorder. But this only works if you use a scart cable to connect the TV set to your DVD recorder (**EXT 1 TO TV-I/O** socket) and your TV set responds to this switch-over.
MONITOR	**Monitor**: This button lets you switch between disc playback or the picture of the internal tuner (TV channel).
DIM	**Dimmer**: This button lets you change the brightness of the display to one of two levels or switch it off.
RETURN	**Back**: Return to previous menu on a video CD (VCD). This also works with some DVDs.
T/C	**Title/Chapter**: Choose the 'T'(Title)/'C'(Chapter) directly from the menu bar using ▼ , ▲ . If 'INFO' appears in the display, the index menu from a recorded disc or an introductory film will be shown. In this case, this function is not available.
SUBTITLE	**Subtitle** : Select the subtitle language
AUDIO	**Audio**: Selecting the audio language. For recording or during playback using the internal tuner (**MONITOR** key), select language 1 or 2.
ANGLE	**Angle**: Select the camera angle
ZOOM	**Zoom**: Enlarge the picture
DISC MANAGER	**Disc Manager**: Call up or cancel the Disc Manager
EDIT	**EDIT**: For displaying the edit menu for DVD+RW/+R discs, for setting chapter markers, for editing the photos in the 'Digital Photo Manager'
SELECT	**Select**: Select function/value/photos
PHOTO	**Digital Photo Manager**: Open the 'Digital Photo Manager'
DISC-MENU	**Disc menu**: To show the DVD menu or the index screen
SYSTEM-MENU	**System menu**: Call up/cancel the main menu (menu bar at the top of the screen)
◀ ▶ ▲ ▼	**Cursor keys** : Cursor left, right, up, down
CHANNEL +	**Plus** : Next programme number
CHANNEL −	**Minus** : Previous programme number
OK	**Store/confirm**: To store or confirm entry
PLAY ▶	**Playback**: To play a recorded disc.
⏮	**Select previous title/search backwards** : Briefly press the button during playback: Previous chapter/film or previous title Hold down the button: Search backwards Hold down button during still picture, slow motion backwards
STOP ■	**Stop**: Stop playback/recording, except with programmed recordings (TIMER) Hold down button, opens and closes the disc tray.
PAUSE II	**Pause (still picture)**: If this button is pressed during playback, the DVD recorder switches to pause. You will see a still picture. If this button is pressed during recording, the DVD recorder will also switch to pause.
⏭	**Select next title/search forwards** : Briefly press the button during playback: Next chapter/film or next title Hold down the button: Search forwards Hold down button during still picture, slow motion forwards
0..9/abc	**Number-/Letter buttons**: To enter numbers or letters in appropriate entry fields
CLEAR	**Delete**: To delete last entry or clear programmed recording (TIMER)

Additional TV functions

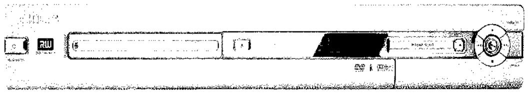
This will only work with TV sets with the same remote control code *RC5) (e.g. Philips TV sets)

TV VOLUME +	**TV volume**: Increase TV volume
TV VOLUME −	**TV volume**: Reduce TV volume
MUTE 🔇	**TV sound off**: Switch TV sound on/off

For the following functions you need to hold down the button at the left side **• TV** and then select the function you need with the appropriate button.

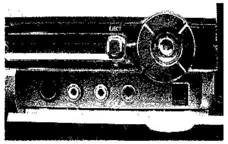
STANDBY ⏻	**Switching the TV off**
0..9/abc	**Number buttons**: 0 - 9
CHANNEL +	**TV programme number**: To select a higher programme number
CHANNEL −	**TV programme number**: To select a lower programme number

Front of the device



STANDBY-ON ⏻	**Switch on or off**: To switch off or on, interrupt a function, interrupt a programmed recording (TIMER)
OPEN/CLOSE ⏏	**Open/close disc tray**: Open/close disc tray
MEDIA SLOT	**Media Slot for PC (PCMCIA)-cards (adapters)**
EJECT	**Eject PC-(PCMCIA) card**:
RECORD	**Record**: Record the current TV channel
▶	**Playback**: To play a recorded disc
⏮	Select previous title/search backwards
⏭	Select next title/search forwards
■	**Stop**: Interrupt playback/recording

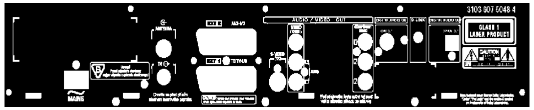
Behind the flap at the right-hand corner on the front



Switching between the **S-VIDEO** and **VIDEO** sockets takes place automatically. If a signal is available at both sockets at the same time, the signal at the **S-VIDEO** socket has priority.

S-VIDEO	**S-Video socket**: Connection of SVHS/Hi8 camcorders or SVHS/Hi8 video recorders (programme number 'CAM 1')
Yellow socket VIDEO	**Video input socket**: Connection of camcorders or video recorders (programme number 'CAM 1')
White/red socket left AUDIO right	**Audio input socket left/right** : Connection of camcorders or video recorders (programme number 'CAM 1')
DV IN	**i-Link/DV socket (digital video input, IEEE 1394, FireWire)**: Connecting a digital camcorder or other suitable device (programme number 'CAM2').

Back of the unit



∿ MAINS	**Mains socket**: Connection to the mains supply (230V/50Hz)
ANTENNA IN	**Aerial input**: Connection of the aerial
TV OUT	**Aerial output**: Connection of the TV set
EXT 2 AUX-I/O	**Scart socket 2**: Connection of an additional device (satellite receiver, set-top box, video recorder, camcorder, etc.). RGB input
EXT 1 TO TV-I/O	**Scart socket 1**: Connection of a TV set. RGB output

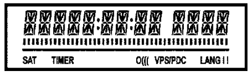
Output sockets (AUDIO/VIDEO OUT)

S-VIDEO (Y/C) OUT	**S-Video output**: Connection of an S-Video-compatible TV set
VIDEO (CVBS) OUT	**Video output (yellow socket)**: Connecting a TV set with a video input (CVBS, Composite Video)
AUDIO L/R OUT	**Analogue audio output (white/red socket)**: Connection of a TV set with audio input sockets or connection of an additional device
COMPONENT VIDEO OUT	**Component Video output (red/blue/green socket)**: Connection of an additional device with Component Video input

Output sockets (DIGITAL AUDIO OUT)

COAX OUT	**Coaxial digital audio output**
OPTICAL AUDIO OUT	**Optical digital audio output**

The symbols on your DVD recorder display



These symbols can light up on your DVD recorder display:

8888	Multi-function display/text line •) Clock •) Disc/title playing time •) OTR switch-off time •) Title name •) Display of the programme number of the TV channel/playing time/channel name/function. •) Display of information and alerts
IIIIIIIIIIIIII	Disc bar: Displays the current position on the disc (disc pointer). Play/Record: Single flashing segment at the current position. Pause: Flashing segment on both sides of the current position. Stop: Illuminated segment at the current position.
SAT	An automatic recording from a satellite receiver (SAT recording) has been programmed.
TIMER	A recording (timer) has been programmed
o(((	A remote control signal has been received
VPS/PDC	Video programming system / programme delivery control: A VPS or PDC code will be transmitted for the selected TV program
LANG II	During playback a 2-channel tone was detected or a 2-channel tone was received. 'I' or 'II' lights up depending on which sound channel has been selected (button **AUDIO**)

Messages in the DVD recorder display

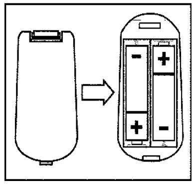
The following messages may appear in your DVD recorder display

IS TV ON?	The DVD recorder is in initial installation mode. Switch the TV on, then read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.
NO SIGNAL	No input signal available (signal inadequate or unstable)
MENU	The menu on the screen is active
OPENING	Disc tray opening
TRAY OPEN	Disc tray open
CLOSING	Disc tray closing
READING	Disc being read
MENU UPDT	Once recording has been successfully completed the table of contents is created.
INIT MENU	The menu structure is created after the first recording has been made on a new disc
COPY PROT	You received a copy-protected signal. This may come from a copy-protected DVD/videotape of a DVD/video player or from a TV channel.
WAIT	Please wait until this message disappears. The DVD recorder is busy performing a task.
NO DISC	A disc has not been inserted for recording. If a disc has been inserted, it cannot be read.
INFO	Information about the inserted DVD is displayed on the screen
BUSY	The DVD recorder is processing the changes to make them DVD compatible
ERASING	The entire disc is erased
EMPTYDISC	The disc inserted is either new or has been completely erased (no recordings).
PROTECTED	The disc is protected against recording.
MAX TITLE	The maximum number of titles per disc has been reached. The maximum number of titles on a disc is 48.
MAX CHAP	The maximum number of chapters within a title/or the disc has been reached. The maximum number of chapters within a title is 99, on a disc 124.
DISC FULL	The disc is full. There is no space for new recordings

PAL DISC	A disc with PAL recordings has been inserted. The machine is trying to record an NTSC signal. Insert a new disc or one that contains NTSC recordings.
NTSC DISC	A disc with NTSC recordings has been inserted. The machine is trying to record a PAL signal. Insert a new disc or one that contains PAL recordings.
RECORDING	An illegal action (e.g. **OPEN/CLOSE ▲** button) was attempted during recording.
FREETITLE	Playback was started for an empty title or the following title is empty.
DISC LOCK	An attempt has been made to record during playback of a protected disc. This message appears if an attempt is made to insert a chapter marker (**EDIT** button).
DISC ERR	An error occurred when writing the title. If this error keeps occurring, please clean the disc or use a new one. For instructions on how to clean a disc see the section on 'Cleaning the discs' in the next chapter.
DISC WARN	An error occurred when writing the title. Recording was continued; the error was skipped
SETUP	After the automatic search the menu for setting the date/time will appear on the screen.
WAIT 01	During the automatic channel search the TV channels found will be counted.
BLOCKED	The disc tray cannot be closed/opened.
SAFE REC	The new recording will be added at the end of all the other recordings (SAFE RECORD).
EASYLINK	Data transfer 'EasyLink' from the TV is in progress
POST-FORMAT	After the creation of the menu structure the disc is prepared
PHILIPS	The DVD-Recorder has been switched on
STANDBY	The DVD-Recorder has been switched off
PHOTO	The 'Digital Photo Manager' is switched on
VIDEO	The 'Digital Photo Manager' will be switched off
SAVING	Data will be written on the inserted memory card or on a DVD+RW/+R

2 Connecting the DVD recorder

Preparing the remote control for operation



The remote control and its batteries are packed separately in the original DVD recorder packaging. You must install the batteries in the remote control before use - described in the following section.

❶ Take the remote control and the enclosed batteries (2 batteries).

❷ Open the battery compartment, insert the batteries as shown and then close the battery compartment.

The remote control is now ready to use.
Its range is approximately 5 to 10 meters.

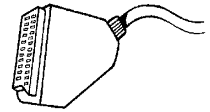
'Aim' correctly
In the following sections, you will need the remote control for the first time. Aim the remote control at the DVD recorder and not at the TV set.

Tip

Connecting your DVD recorder to the TV set

The necessary cable connections must be made before you can record or playback TV programmes using your DVD recorder.

Connect the DVD recorder **directly** to your TV set. If there is a video recorder in between the picture quality may be poor.
We recommend that you use a scart cable to connect your TV set and DVD recorder.



What is a scart cable?
The scart or Euro AV cable serves as the universal connector for picture, sound and control signals. With this type of connection, there is practically no loss of quality in picture or sound transmission.

?

When you install your DVD recorder for the first time, select one of the following options:

'Connecting with a scart cable and Easy Link'
If your TV set is equipped with 'Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link, Megalogic, Datalogic, ...' and you wish to use a scart cable.

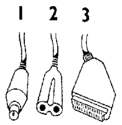
'Connecting with a scart cable without Easy Link'
If your TV set is not equipped with 'Easy Link, Cinema Link, NexTView Link, Q-Link, Smart Link, Megalogic, Datalogic, ...' and you wish to use a scart cable.

'Connecting with an S-Video(Y/C)cable'
If your TV set is equipped with an S-Video(SVHS) socket.

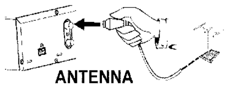
'Connecting with video(CVBS) cable'
If your TV set is equipped only with an video(CVBS) socket.

Connecting with a scart cable and 'Easy Link'

Your DVD recorder can exchange information with your TV set using 'Easy Link'. Your TV channels can also be transferred in the same order from your TV set to your DVD recorder using 'Easy Link'.
Please see your TV's operating instructions.

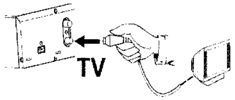


Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a special scart cable (3, suitable for Easylink).

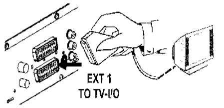


❶ Switch off your TV set.

❷ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA IN** socket at the back of the DVD recorder.



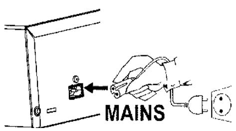
❸ Insert one end of the supplied aerial cable into the **TV OUT** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.



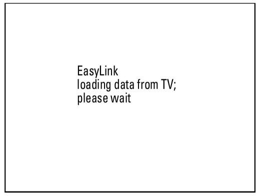
❹ Plug in a full-pin scart cable (all 21 contacts wired) into the scart socket **EXT 1 TO TV-I/O** at the back of the DVD recorder and the corresponding scart socket - suitable for Easylink - at the back of the TV set (see TV set operating instructions).

❺ Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

❻ Switch on the TV set.



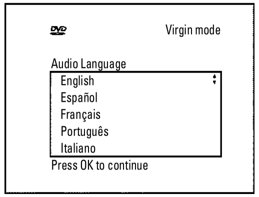
❼ Use the supplied mains cable to connect the mains socket **∿MAINS** at the back of the DVD recorder with the wall outlet.
The most important features of the DVD recorder will appear in scrolling text on the display. After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.


EasyLink
loading data from TV;
please wait

❽ Switch on the DVD recorder using **STANDBY-ON ⏻**.
A message appears on the screen announcing that the transfer has started. 'EASYLINK' appears on the display during transfer.
The TV set transfers all saved TV channels, in the same order, to the DVD recorder
This may take several minutes.

×'*Time*', '*Year*', '*Month*', '*Date*' appears on the TV screen
❶ Check if the time in '***Time***' is correct.
❷ If required, change the time with the number buttons **0..9/abc** on your remote control.
❸ Select the next line with ▲ or ▼ .
❹ Check if the displayed settings for '***Year***', '***Month***' and '***Date***' are correct.
❺ When all information is correct, save by pressing **OK** .

Problem



Virgin mode

Audio Language
English
Español
Français
Português
Italiano
Press OK to continue

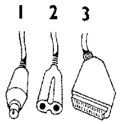
×I can see more installation menus on my TV set
Not all the necessary data has been transferred. Please enter the settings by hand as follows. For more information on the various functions see 'Initial installation' in 'Installing your DVD recorder'.

❶ Select the desired audio language using ▼ or ▲ and confirm with **OK** .
❷ Select the desired subtitle language with ▼ or ▲ and confirm with **OK** .
❸ Select the desired screen format position using ▼ or ▲ .
'***4:3 letterbox***' For a 4:3 TV set; cinema format (black bars above and below the picture)
'***4:3 panscan***' For a 4:3 TV set; full height format with the sides cut off
'***16:9***' For a 16:9 TV set
❹ Confirm with **OK** .
❺ Select the country of your residence with ▼ or ▲ .
If your country does not appear, select '***Other***'.
❻ Confirm with **OK** .

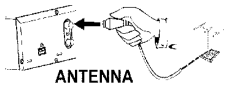
Problem

Initial installation is now complete.

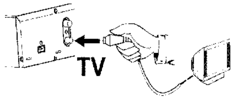
Connecting with a scart cable without 'Easy Link'



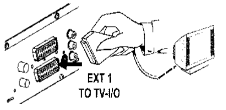
Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a scart cable (3).



❶ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA IN** socket at the back of the DVD recorder.



❷ Insert one end of the supplied aerial cable into the **TV OUT** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.



❸ Plug a scart cable into the scart socket **EXT 1 TO TV-I/O** at the back of the DVD recorder and the scart socket for the DVD recorder at the back of the TV set (see TV set operating instructions).

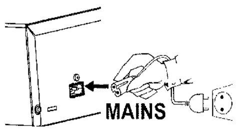
My TV set has several scart sockets. Which one should I use?
Select the scart socket that is suitable for both video output and for video input.

My TV set shows me a selection menu for the scart socket
Select 'VCR' as the source for this scart socket.

?

❹ Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.

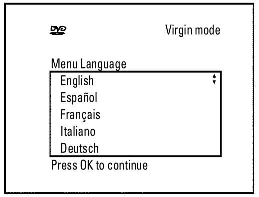
❺ Switch on the TV set.



❻ Insert one end of the supplied mains cable into the mains socket **∿MAINS** at the back of the DVD recorder and the other end into the wall socket.
The most important features of the DVD recorder will appear in scrolling text on the display. After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.

❼ Switch on the DVD recorder using **STANDBY-ON**⏻. 'IS TV ON?' will appear on the display.

❽ If the connection was properly made and your TV was **automatically switched** to the programme number for the scart socket, e.g. 'EXT', '0', 'AV', you will see the following picture:



Virgin mode

Menu Language
English
Español
Français
Italiano
Deutsch
Press OK to continue

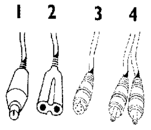
× **My screen is empty.**
- ✓ Depending on the initializing period it can take some time before you see the picture on the TV.
- ✓ Many TV sets are switched by the DVD recorder to the programme number for the scart socket by way of a control signal sent through the scart cable.
- ✓ If the TV set does not automatically switch to the scart socket programme number, manually change to the corresponding programme number on your TV set (see your TV's operating instructions).
- ✓ Check that the scart cable is connected from the TV set to the **EXT 1 TO TV-I/O** socket on the DVD recorder. The **EXT 2 AUX-I/O** socket is intended only for additional devices.

Problem

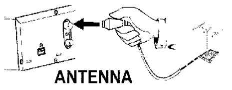
Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting with an S-Video(Y/C)cable

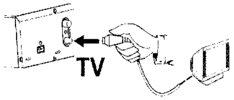
This connecting cable, also known as the SVHS cable, is used to transmit the brightness signal (Y signal) and colour signal (C signal) separately. This mini DIN socket/plug is also called a Hosiden socket/plug.



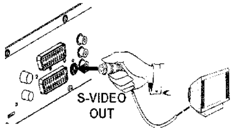
Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), an S-Video(SVHS) cable (3), an audio cable (4, supplied, red/white plug).



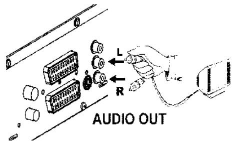
❶ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA IN** socket at the back of the DVD recorder.



❷ Insert one end of the supplied aerial cable into the **TV OUT** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.

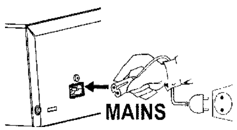


❸ Insert one end of an S-Video(SVHS) cable into the **S-VIDEO (Y/C) OUT** socket at the back of the DVD recorder and the other end into the S-Video (SVHS) input socket on the TV set (usually labelled 'S-Video in' or 'SVHS in'. See TV operating instructions).



❹ Insert one end of the supplied audio (Cinch) cable into the red/white Cinch socket **AUDIO L/R OUT** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).

❺ Switch on the TV set. Switch the TV set over to the SVHS input socket or select the relevant programme number. Please see your TV's operating instructions for the programme number you need.



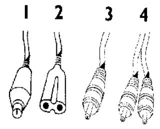
❻ Insert one end of the supplied mains cable into the mains socket **∿MAINS** at the back of the DVD recorder and the other end into the wall socket.
The most important features of the DVD recorder will appear in scrolling text on the display. After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.

❼ Switch on the DVD recorder using **STANDBY-ON** ⏻. IS TV ON?' will appear on the display.

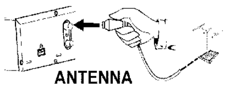
Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

Connecting with video(CVBS) cable

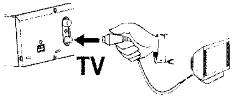
This cable, usually with yellow Cinch connectors, is used for transmitting the Composite Video signal (FBAS, CVBS). In this method of transmission the colour signal and the brightness signal are transmitted on the same cable. In certain circumstances, this can lead to problems with the picture, such as 'Moiré' patterns.



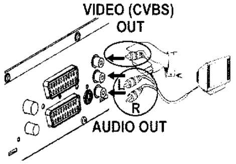
Have the following cables ready:
an aerial cable (1, supplied), a mains cable (2, supplied), a video (CVBS)cable (3, supplied, yellow plug), an audio cable (4, supplied, red/white plug).



❶ Remove the aerial cable plug from your TV set. Insert it into the **ANTENNA IN** socket at the back of the DVD recorder.



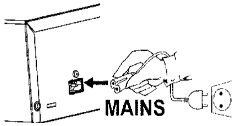
❷ Insert one end of the supplied aerial cable into the **TV OUT** socket at the back of the DVD recorder and the other end into the aerial input socket at the back of the TV set.



❸ Insert one end of the supplied video (CVBS) cable into the yellow Cinch socket **VIDEO (CVBS) OUT** at the back of the DVD recorder and the other end into the video input socket (usually yellow) on the TV set (usually labelled 'Video in' or 'AV in'. See TV operating instructions).

❹ Insert one end of the supplied audio (Cinch) cable into the red/white Cinch socket **AUDIO L/R OUT** at the back of the DVD recorder and the other end into the audio input socket (usually red/white) on the TV set (usually labelled 'Audio in' or 'AV in'. See TV operating instructions).

❺ Read the next chapter 'Connecting additional devices' on how to connect additional devices (satellite receivers, videorecorders,...) to the input-/output sockets.



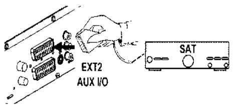
6. Switch on the TV set. Switch the TV set over to the Video/Audio input socket or select the relevant programme number. Please see your TV's operating instructions for the programme number you need.

7. Insert one end of the supplied mains cable into the mains socket ∿**MAINS** at the back of the DVD recorder and the other end into the wall socket.
The most important features of the DVD recorder will appear in scrolling text on the display. After the first installation is completed this function will be switched off. How you switch on this function again, read in the chapter 'User preferences' in the section 'standby'.

8. Switch on the DVD recorder using **STANDBY-ON** ⏻. 'IS TV ON?' will appear on the display.

Then, read the paragraph on 'Initial installation' in 'Installing your DVD recorder'.

3 Connecting additional devices



Connecting additional devices to the second scart socket

You can connect additional devices such as decoders, satellite receivers, camcorders, etc. to the **EXT 2 AUX-I/O** socket. When playback is started on this additional device the DVD recorder automatically connects the **EXT 2 AUX-I/O** scart socket with the **EXT 1 TO TV-I/O** scart socket. You will then see the picture from the additional device on your TV set, even if the DVD recorder is switched off.
The **TV/DVD** button on the remote control allows you to switch between playback through the **EXT 2 AUX-I/O** scart socket and playback from the DVD recorder.

The DVD recorder must be connected **directly** to the TV set (**EXT 1 TO TV-I/O** socket directly to the TV set). If there is a video recorder in between the picture quality may be poor because of the copy protection system built into the DVD recorder.

Connecting a video recorder, DVD player.

You can connect a video recorder or a DVD player to the **EXT 2 AUX-I/O** input socket. If you already have an external receiver (satellite receiver, set-top box, cable TV box) connected to this socket, you can connect the video recorder to the 'VCR', 'TO VCR', ...socket of the external receiver.
You can also use the front sockets **S-VIDEO**, **VIDEO** and the **left AUDIO right** audio sockets.

Please note:
Most prerecorded video cassettes and DVDs are copy-protected. If you try to copy them you will see the message 'COPY PROT' on the DVD recorder's display.

× **When copying video cassettes the display on the DVD recorder shows 'NO SIGNAL'**
- ✓ Check that the cable is plugged in firmly.
- ✓ If a recording is made from a video recorder, change the tracking on the video recorder.
- ✓ The DVD recorder may not be able to recognise the video input signal if this signal is poor or does not comply with relevant standards.

× **When I copy DVD video discs or prerecorded video cassettes the picture is fuzzy and the brightness varies**
- ✓ This happens if you try to copy DVDs or video cassettes that have been copy-protected. Even though the picture on the TV is fine the recording on a DVD+RW/+R is faulty. This interference is unavoidable with copy-protected DVDs or video cassettes.

Problem

Connecting an external receiver (satellite receiver, set-top box, cable TV box,...)

You can connect external receivers to the **EXT 2 AUX-I/O** socket.
For additional receivers, you can also use the **EXT 1 TO TV-I/O** socket (if the TV set is connected to the **COMPONENT VIDEO OUT** sockets), and **VIDEO**, **S-VIDEO** sockets at the front. Please observe that you also have to connect an audio cable to the **IN AUDIO L/R** or **left AUDIO right** socket.

❶ Connect the **scart socket** of the receiver (satellite receiver) provided for the TV set (usually labelled 'TV', 'TO TV'), with the **EXT 2 AUX-I/O** socket of the DVD recorder.

Why can't I use the 'VCR', 'TO VCR',... socket?
In order to achieve the best possible picture quality, you must use the RGB (red-green-blue) signal of the receiver. As a rule, this signal is available at the 'TV', 'TO TV',... socket. The DVD recorder transfers the signal to the **EXT 1 TO TV-I/O** socket.

Some receivers only provide a 'Video (CVBS/FBAS)' signal at the 'VCR', 'TO VCR'...socket. Read the instruction manual of the receiver on the signals available at the sockets.

If you are satisfied with the picture quality of the 'VCR', 'TO VCR',... socket, you can also use this socket.

❷ If your external receiver offers several options for the signal available at the 'TV', 'TO TV',... socket, choose the 'RGB' setting.

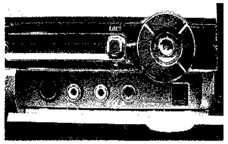
Connecting additional devices only via aerial cable

If you want to connect additional devices (e.g. satellite receiver...) only via aerial cable, please observe the following:

The DVD-Recorder must be connected directly to the TV set. If there is a video recorder or an additional device in between, the picture quality may be poor because of the copy protection system built into the DVD-Recorder.

The additional device (satellite receiver) must be connected **before** the DVD recorder (additional device - DVD recorder - TV set). Only the TV set must be connected to the **TV OUT** socket.

- •) If there is interference in the picture when the additional device is switched on, a TV broadcaster may be transmitting on the same channel or a channel very close to that of the additional device. (e.g.: TV broadcaster on channel 45, additional device (satellite receiver) also on channel 45). In this case, change the channel of the additional device (satellite receiver). Consult the instruction manual of the additional device.
  You must also store this channel on the DVD recorder to be able to record TV programmes from the additional device (satellite receiver).
- •) Switch on the additional device during the installation of the DVD recorder. During the automatic channel search, the channel on which the additional device is transmitting will be stored as a TV channel.



Connect camcorder to the front sockets

To copy camcorder recordings, you can use the front sockets. These sockets are located behind the flap on the right hand side.

Best picture quality

If you have a DV or Digital 8 camcorder, connect the **DV IN** input of the DVD recorder to the appropriate DV output on the camcorder.
When films are transferred the original recording date and time are stored as DVD subtitles.
On playback, this data can be displayed on the TV screen by using the '⎕' function (Subtitle).

Choose 'CAM2' as a programme number for this input.

Very good picture quality

If you have a Hi8 or S-VHS(C) camcorder, connect the **S-VIDEO** input of the DVD recorder to the appropriate S-VHS output on the camcorder.
You must also connect the audio input **left AUDIO right** on the DVD recorder to the audio output on the camcorder.

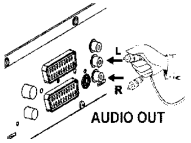
Choose 'CAM1' as a programme number for this input.

Good picture quality

If you have a camcorder that only has a single video output (Composite Video, CVBS), connect the **VIDEO** input on the DVD recorder to the appropriate output on the camcorder.
You must also connect the audio input **left AUDIO right** on the DVD recorder to the audio output on the camcorder.

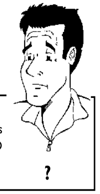
Choose 'CAM1' as a programme number for this input.

Connecting audio devices to the analogue audio sockets



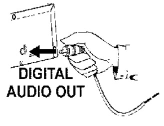
Two audio output sockets **AUDIO L/R OUT** are located on the back of the DVD recorder (audio signal output left/right)

These can be used to connect the following:
- •) **a receiver with Dolby Surround Pro Logic**
- •) **a receiver with two-channel analogue stereo**



Can I use the 'Phono' input on my amplifier?
This socket (input) on the amplifier is designed only for record players without preamplifiers. Do **not** use this input for connecting the DVD recorder.
The DVD recorder or the amplifier may be damaged as a result.

Connecting audio devices to the digital audio sockets



At the back of the DVD recorder there are two digital audio output sockets **OPTICAL AUDIO OUT** for an optical cable and **COAX OUT** for a coaxial cable (Cinch cable).

These can be used to connect the following:
- **•) an A/V receiver or an A/V amplifier with a digital multi-channel sound decoder**
- **•) a receiver with two-channel digital stereo (PCM)**

Digital multi-channel sound

Digital multi-channel sound offers the best possible sound quality. You will need a multi-channel A/V receiver or amplifier that supports at least one of the audio formats of the DVD recorder (MPEG2, Dolby Digital and DTS). Consult the operating instructions for your receiver to find out which audio formats it supports.

?

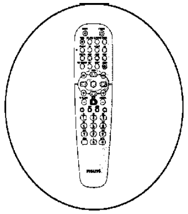
Problem

× **All I can hear from my loudspeakers is a loud distorted noise**

✓ The receiver is not compatible with the digital audio format of the DVD recorder. The audio format of the DVD disc is displayed in the status window when you switch to another language. Playback in six-channel digital surround sound is only possible if the receiver has a digital multi-channel sound decoder.

4 Installing your DVD recorder

Initial installation



After successfully connecting your DVD recorder to the TV set and other additional devices as described in the previous chapters, this chapter will show you how to start the initial installation. The DVD recorder automatically seeks out and stores all available TV channels.

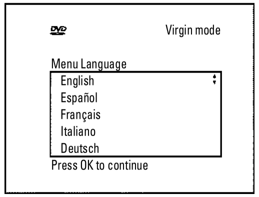
Tip

Connecting additional devices

If you have connected additional devices such as a satellite receiver to the aerial cable, switch them on. The automatic channel search will recognise it and save it. Please observe that you must switch on a "test signal" for some additional devices.

No aerial connected

Even if you only want to use the DVD recorder to play back or have only connected a satellite receiver, you must still complete the initial installation. This is necessary so that the basic settings are stored correctly. Once initial installation is complete you can use the DVD recorder as normal.



Virgin mode

Menu Language
English
Español
Français
Italiano
Deutsch
Press OK to continue

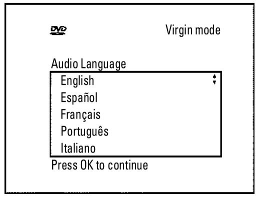
❶ Select the desired language for the on-screen menu by pressing ▼ or ▲ .

What is an on-screen menu?

The multi-language on-screen menu takes the mystery out of using your new DVD recorder. All settings and/or functions are displayed on your TV screen in the relevant language.

?

❷ Confirm with **OK** .



Virgin mode

Audio Language
English
Español
Français
Português
Italiano
Press OK to continue

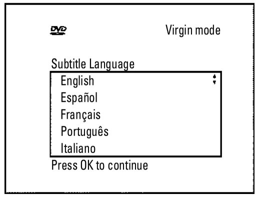
❸ Select the desired audio language using ▼ or ▲ .

What is an audio language?

The DVD will play the sound in the language you select, provided this language is available on the disc. If it is not available on the disc the first language on the DVD will be used instead. The DVD Video Disc menu, if available, will also be displayed in the language you select.

?

❹ Confirm with **OK** .



Virgin mode

Subtitle Language
English
Español
Français
Português
Italiano
Press OK to continue

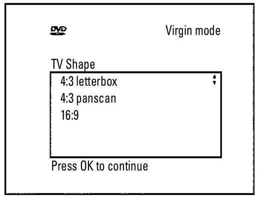
❺ Select the desired language for the subtitles by pressing ▼ or ▲ .

What is the subtitle language?

The subtitles will be displayed in the language you select, provided this language is available on the disc. If it is not available on the disc the fist language on the DVD will be used instead.

?

❻ Confirm with **OK** .



TV Shape
4:3 letterbox
4:3 panscan
16:9
Press OK to continue

⑦ Select the desired screen format position using ▼ or ▲ . These settings will only be used if you insert a DVD that contains this information.

Which screen formats can I select?

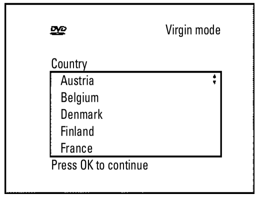
'*4:3 letterbox*' for a 'wide-screen' (cinema format) picture with black bars at the top and bottom.

'*4:3 panscan*' for a full-height picture with the sides trimmed.

'*16:9*' for a wide-screen TV set (screen edge ratio 16:9)

?

⑧ Confirm with **OK** .



Country
Austria
Belgium
Denmark
Finland
France
Press OK to continue

⑨ Select the country of your residence with ▼ or ▲ .
If your country does not appear, select '*Other*'.

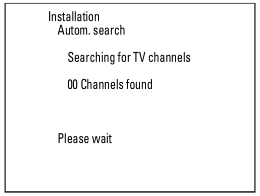
Why do I have to select a country?

To call up the specific settings for the respective country, you must first install the country.

?

⑩ Confirm with **OK** .

⑪ After you connect the aerial (or cable TV, satellite receiver, etc.) to the DVD recorder, press **OK** .
The automatic TV channel search starts. 'WAIT' will appear on the display.



Installation
Autom. search
Searching for TV channels
00 Channels found
Please wait

× The DVD recorder cannot find any TV stations

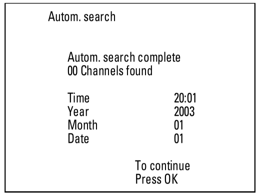
✓ Select channel 1 on the TV set. Can you see the stored TV channel on the TV set?
If not, check the cable connection from the aerial (aerial socket) to the DVD recorder and to the TV set.

✓ Please have patience.
The DVD recorder searches the entire frequency range in order to find and save the largest possible number of TV channels.

✓ If you have not connected an aerial, go through all the basic settings right to the end and then, if you wish, start the automatic search (see 'Automatic TV station search').

Problem

⑫ When the automatic TV channel search is complete, '***Autom. search complete***' will appear on the TV screen.
'*Time*', '*Year*', '*Month*', '*Date*' will then appear on the TV screen.



Autom. search
Autom. search complete
00 Channels found
Time 20:01
Year 2003
Month 01
Date 01
To continue
Press OK

⑬ Check if the time in '*Time*' is correct.

⑭ If required, change the time with the number buttons **0..9/abc** on your remote control.

⑮ Select the next line with ▲ or ▼ .

⑯ Check if the displayed settings for '*Year*', '*Month*' and '*Date*' are correct.

⑰ When all information is correct, save by pressing **OK** .

The initial installation is now complete.

Satellite receiver

If you are connecting a satellite receiver, please read the section on 'Using a satellite receiver'.

Decoder

If you are connecting a decoder, you must install it as described in the next section.

Tip

× Sound may be distorted on some TV channels.

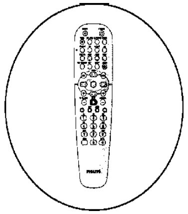
✓ If the sound is distorted on any of the stored TV channels or if there is no sound at all, the wrong TV system may have been stored for the TV channel. Read 'Manual TV channel search' for information on how to change the TV system.

Problem

Using a satellite receiver

TV channels from a satellite receiver (connected to scart socket **EXT 2 AUX-I/O**) are received on the DVD recorder on programme number '*EXT2*'

If necessary, use the **MONITOR** button to switch to the internal tuner.
Select programme number '*EXT1*' with **0** on the remote control and then select programme number '*EXT2*' with **CHANNEL –** .
You should select the TV channels to be received by the satellite receiver directly on the receiver itself.



Allocating a decoder

Some TV channels send coded TV signals that can only be viewed properly with a purchased or rented decoder. You can connect such a decoder (descrambler) to your DVD recorder. The following function automatically activates the connected decoder for the TV channel you want to watch.

How do I allocate the decoder for Easy Link?
If your TV set supports 'Easy Link' the decoder must be assigned to the relevant TV channel on the TV set (see the operating instructions for your TV set). Settings cannot then be made in this menu. ?

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Use the **CHANNEL +** and **CHANNEL −** buttons or the number buttons **0..9/abc** on the remote control to select the TV channel for which you want to use the decoder. If necessary, use the **MONITOR** button to switch to the internal tuner.

❹ Press the **SYSTEM-MENU** button on the remote control. The menu bar appears.

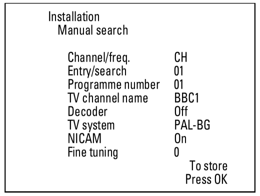
❺ Select '𝐓⅄' symbol with ◀ or ▶ .

❻ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

❼ Select '***Manual search***' using ▼ or ▲ and confirm with ▶ .

❽ Select '***Decoder***' using ▼ or ▲ .

❾ Select '***On***' with ◀ or ▶ .



Installation
Manual search

Channel/freq.	CH
Entry/search	01
Programme number	01
TV channel name	BBC1
Decoder	Off
TV system	PAL-BG
NICAM	On
Fine tuning	0

To store
Press OK

How do I switch the decoder off again?
Use ▶ to select '***Off***' in the '***Decoder***' line on the screen (Decoder off). ?

❿ Confirm with **OK** .

⓫ To end, press **SYSTEM-MENU** .

Your decoder has now been allocated to this TV channel.

Connection using a component video (Y Pb Pr/YUV) cable

Component video (Y Pb Pr) is the highest quality picture transmission option. This is achieved by dividing the video signal into a luminance signal (Y) and two colour difference signals - red minus luminance (V) and blue minus luminance (U). As a rule, "Cr" or "R-Y" is used to describe the red difference signal and "Cb" or "B-Y" the blue difference signal.
These signals are transmitted through separate lines. The connectors of this cable and the corresponding sockets are usually green (luminance), blue (Pb, Cb, B-Y), and red (Pr, Cr, R-Y).

If you choose this type of connection, the DVD recorder must already be connected and completely installed (initial installation complete).
Switching of the signal to the **COMPONENT VIDEO OUT** sockets is carried out in a menu that is not yet available during the initial installation.

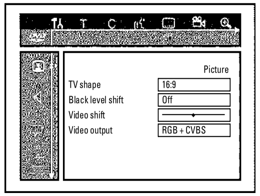
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press the **SYSTEM-MENU** button on the remote control. The menu bar appears.

❹ Select '𝐓⅄' using ◀ oder ▶ and confirm with ▼ .

❺ Select the '▣' symbol using ▼ or ▲ and confirm with ▶ .



Picture

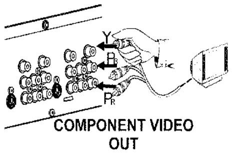
TV shape	16:9
Black level shift	Off
Video shift	
Video output	RGB + CVBS

❻ Select the line '***Video output***' using ▲ or ▼ and confirm with ▶ .

❼ Select your setting with ▼ or ▲ .

Which setting should I choose?
Since YPbPr (YUV) signals are not transmitted simultaneously with S-video(Y/C) and video (FBAS/CVBS) signals, you can choose between the two types. The 'RGB' signal is switched off.
'***S-video + YPbPr***' Component Video (YUV) and S-Video(Y/C).
'***CVBS + YPbPr***'Component Video (YUV) and Video (FBAS/CVBS).
With all other settings, the signal is switched off at the **COMPONENT VIDEO OUT** sockets. This will also be displayed as information on the screen.
For more information on the other settings, read section 'Picture settings' ('***Video output***') in chapter 'User preferences'. ?

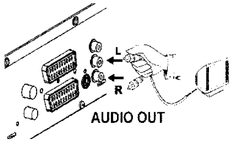
❽ Confirm with **OK** .



❾ Use a component video (Y Pb Pr) cable, connect the three cinch sockets (red, blue, green) **COMPONENT VIDEO OUT** at the back of the DVD recorder with the corresponding three component video input sockets of your TV set, usually labelled 'Component Video Input', 'YUV Input', 'YPbPr', 'YCbCr' or simply 'YUV'.

Warning!
Do not confuse these sockets with the five-component RGB sockets (if available) or the yellow video (CVBS/FBAS) socket and the two audio sockets (red/white). The five-component RGB sockets are only provided for the R-G-B-H-V signals (red, green, blue with horizontal and vertical synchronisation impulse).

Please observe the colour sequence
The colours of the sockets at the DVD recorder and the connectors must match those of the socket colours at the TV set (red-red/blue-blue/green-green). If they don't, the colours of the picture may get mixed up or the picture may not be visible.
Tip

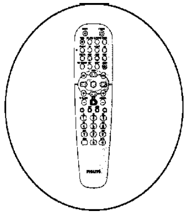


❿ Use an audio (cinch) cable, connect the red/white cinch socket **AUDIO L/R OUT** at the back of the DVD recorder with the mostly red/white audio input socket of your TV set (usually labelled 'Audio in' or 'AV in'. See the instruction manual of your TV set.)

⓫ If necessary, switch your TV set to the component video input socket. Also consult the instruction manual of your TV set.

⓬ The menu of the DVD recorder should now appear on the TV screen. If not, check the cable connections and the settings on your TV set.

Manual TV channel search



In some cases, not all of the available TV channels may have been found and stored during initial installation. In this case, you will need to search for and store the missing or coded TV channels manually.

Manual search with EasyLink
With 'Easy Link', the DVD recorder will automatically download the TV channels stored on the TV set. This is why some lines have no function. To store new TV channels, they must first be stored on the TV set. The information will then be transferred to the DVD recorder automatically.
Tip

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

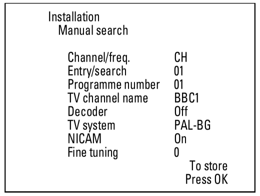
❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❹ Select 'T⅄' symbol with ◀ or ▶ .

❺ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

❻ Select '***Manual search***' using ▼ or ▲ and confirm with ▶ .



```
Installation
  Manual search

    Channel/freq.        CH
    Entry/search         01
    Programme number     01
    TV channel name      BBC1
    Decoder              Off
    TV system            PAL-BG
    NICAM                On
    Fine tuning          0
                                To store
                                Press OK
```

❼ In '***Channel/freq.***', select the desired display using ▶ .
'***Freq.***'(Frequency), '***CH***'(Channel), '***S-CH***'(Special/hyperband channel)

❽ In '***Entry/search***', enter the frequency or channel of the TV station using the number buttons **0..9/abc** .

× I don't know the channel for my TV station
✓ In this case, press ▶ to start the automatic search. A changing channel number/frequency number will appear on the TV screen.
Continue the automatic search until you have found the TV channel you are looking for.
Problem

❾ Using ◀ or ▶ in '***Programme number***', select the programme number you want to use for the TV channel, e.g. '***01***'.

How can I change the namel of a TV channel?
❶ In '***TV channel name***', press ▶ .
❷ Select the desired character position using ◀ or ▶ .
❸ Change the character at the desired position with ▼ or ▲ .
❹ Select the next character position in the same way.
❺ Confirm with **OK** .
Tip

How can I change the TV system of the TV channel?

In '***TV system***', use ◀ or ▶ to select the TV system that produces the least distortion of picture and sound.

What is NICAM?

NICAM is a digital sound transmission system. Using NICAM, you can transmit either 1 stereo channel or 2 separate mono channels. However, if reception is poor and the sound distorted you can turn off NICAM.
In '***NICAM***', select '***Off***' using ◀ or ▶ .

How can I improve the automatic process for storing channels?

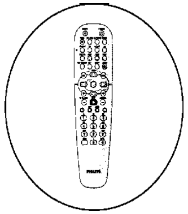
To change the automatic process for storing channels (fine tuning), select '***Fine tuning***'.
Using ◀ or ▶ you can try to fine-tune the TV channelmanually.

Tip

⑩ Press **OK** to store the TV channel.

⑪ To search for other TV channels, begin again at ⑧ .

⑫ To end, press **SYSTEM-MENU** .



Sorting TV channels automatically (Follow TV)

When the automatic channel search function is activated, the TV channels are stored in a specific order. This may differ from the order in which the TV channels appear on your TV set.
This function changes the order of the TV channels stored in your DVD recorder to match the order on the TV set.
This only works if the DVD recorder (**EXT 1 TO TV-I/O** socket) and the TV set **are connected with a scart cable**.

My TV set has Easylink

If your TV set supports 'Easylink...', TV channels will be stored during initial installation in the same order as they appear on the TV set. To store the TV channels in a different order, you'll need to change the order on the TV set. When you start the Follow TV function the information is transferred again from the TV set.

Tip

① Switch on the TV set. If required, select the programme number for the DVD recorder.

② Switch on the DVD recorder using **STANDBY-ON** ⏻ .

③ Press the **SYSTEM-MENU** button on the remote control. The menu bar appears.

④ Select 'ፕ' symbol with ◀ or ▶ .

⑤ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

⑥ Select line '***Follow TV***' with ▼ or ▲ . and confirm with the ▶ button.

⑦ Confirm the message on the screen with **OK** . 'TV 01' will appear in the DVD recorder display.

TV 01

⑧ Select programme number '1' **on the TV set**.

× I cannot switch my TV set to programme number '1'

✓ If you have connected additional devices to the **EXT 2 AUX-I/O** socket, please disconnect these devices. Other connected devices may have switched the TV set to the programme number of the scart socket.

Problem

⑨ Confirm with **OK** on the DVD recorder remote control.
'WAIT' will appear in the display. The DVD recorder compares the TV channels on the TV set and the DVD recorder.
If the DVD recorder finds the same TV channel as on the TV set it stores it at 'P01'.

× 'NOTV' will appear in the display. The DVD recorder is not receiving a video signal from the TV set.

✓ Chech the connectors at both ends of the scart cable.

✓ Check your TV's operating instructions to see which scart socket is used for video signals.

✓ If the problem persists, you won't be able to use this feature.
Please read 'Sorting and deleting TV channels manually'.

Problem

⑩ Wait until for example 'TV 02' appears in the display.

TV 02

⑪ Select the next programme number **on the TV set**, e.g. '2'.

⑫ Confirm with **OK** on the DVD recorder remote control.

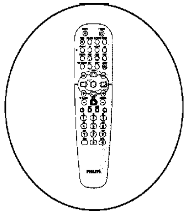
Deleting sorting

You can delete incorrect TV channel sorting by pressing ◀ .

Tip

⑬ Repeat steps ⑩ to ⑫ until you have assigned all the TV channels from your TV set.

⑭ To end, press **SYSTEM-MENU** .



Automatic TV channel search

During installation, all available TV channels are searched for and stored. If the channel assignments of your cable or satellite TV provider change or if you are reinstalling the DVD recorder, e.g. after moving house, you can start this procedure again. This will replace the stored TV channels with the new ones.

My TV set has Easylink

With Easylink, you can search for and store TV channels only on the TV set. These settings are accepted by the DVD recorder. Use this function to start the transfer of TV channels from the TV set.

Tip

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

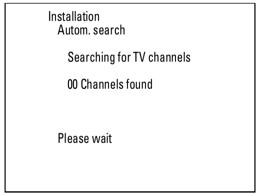
❸ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❹ Select '🛠' symbol with ◀ or ▶ .

❺ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

❻ Select '***Autom. search***' using ▼ or ▲ .

❼ Press ▶ .



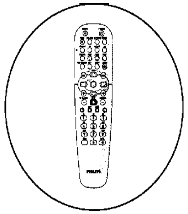
```
Installation
  Autom. search

    Searching for TV channels

    00 Channels found


  Please wait
```

❽ The automatic TV channel search starts. This allows the DVD recorder to save all available TV channels. This procedure may take several minutes.

❾ When all the TV channels have been found, '***Autom. search complete***' will appear on the TV screen.

❿ To end, press **SYSTEM-MENU** .

You can read about how to search for a TV channel manually in 'Manual TV channel search'.



Sorting and deleting TV channels manually

After you have performed the automatic channel search you may not agree with the sequence in which the individual TV channels have been allocated to the programme positions (programme numbers). You can use this function to rearrange the TV channels already stored or to delete TV channels you don't want or those with poor reception.

EasyLink

With Easylink, you can search for and store TV channels only on the TV set. These settings are then transferred to the DVD recorder. That is why you cannot select this function manually.

Tip

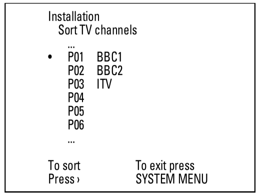
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder. Press the **SYSTEM-MENU** button on the remote control. The menu bar appears.

❸ Select '🛠' symbol with ◀ or ▶ .

❹ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

❺ Select '***Sort TV channels***' using ▼ or ▲ and confirm with ▶ .



```
Installation
  Sort TV channels
    ...
•   P01  BBC1
    P02  BBC2
    P03  ITV
    P04
    P05
    P06
    ...

To sort        To exit press
Press ›        SYSTEM MENU
```

❻ Using ▼ or ▲ select the TV channel that you want to delete or whose order you want to change.

❼ Confirm with ▶ .

Deleting TV channels

Unwanted channels or those with poor reception can be deleted using **CLEAR** . Proceed at step ❻ .

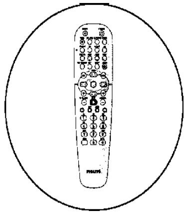
Tip

❽ Using ▼ or ▲ , shift the TV channel to the desired position and press the ◀ button. The DVD recorder will insert the TV channel.

❾ Repeat steps ❻ to ❽ until you have resorted/deleted all the TV channels you want.

❿ To store, press **OK** .

⓫ To end, press **SYSTEM-MENU** .



Setting the language/country

You can select the country and, for the basic setting of DVD playback, the language for the subtitles and the audio language. Please note that with some DVDs the audio language and/or subtitle language can be changed only via the DVD menu.
For bilingual shows, you can also select the sound channel of the TV station via the internal tuner (**MONITOR** button) for recording or playback.
You also have the option of setting one of the displayed languages for the on-screen menu (OSD). However, the DVD recorder display will only display English text regardless of this setting.

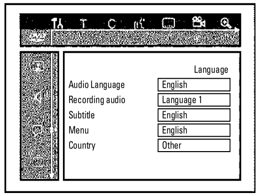
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❹ Select '⚒' symbol with ◀ or ▶ .

❺ Select line '***Language***' with ▼ or ▲ and confirm with the ▶ button.



Language

Audio Language	English
Recording audio	Language 1
Subtitle	English
Menu	English
Country	Other

❻ Select the appropriate line and confirm with ▶ .

Tip

Which settings can I choose?
'***Audio Language***' : The DVD will play back in the language you have chosen.
'***Recording audio***' : In the case of bilingual programmes, you can choose either '***Language 1***' or '***Language 2***' as the default setting
'***Subtitle***' : Subtitle language
'***Menu***': Language of the OSD menu
'***Country***' : Location

❼ Select the appropriate setting using ▼ or ▲ and confirm with **OK** .

❽ To end, press **SYSTEM-MENU** .

'*Recording audio*' switching over (2-channel sound)

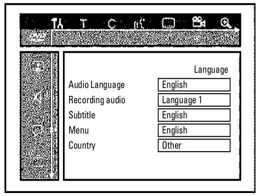
Some TV programmes transmit an extra audio signal in stereo in addition to the normal audio signal (2-channel sound). In most cases this means that an additional language is available. If a TV programme is available in, say, English and German, German may be available as the second language.
To record TV programmes in 2-channel sound, you can select the language you want as the default setting. This setting does not become active until the sound of a TV programme is transmitted in 2-channel sound.
When you play back the recording you can play back the sound only in the language you used for the recording.

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❹ Select '⚒' symbol with ◀ or ▶ .



Language

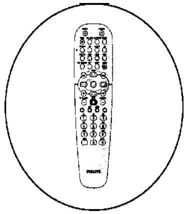
Audio Language	English
Recording audio	Language 1
Subtitle	English
Menu	English
Country	Other

❺ Select line '***Language***' with ▼ or ▲ . and confirm with the ▶ button.

❻ Select line '***Recording audio***' and confirm with ▶ .

❼ Select '***Language 1***' or '***Language 2***' with ▼ or ▲ and confirm with **OK** .

❽ To end, press **SYSTEM-MENU** .



Setting the time and date

If the display shows an incorrect time or '--:--', the time and date must be reset manually.

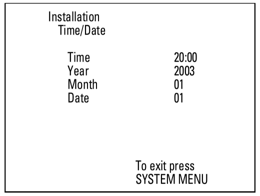
'SMART CLOCK' automatically sets the time and date using the information transmitted by the TV channel. Normally the TV channel stored at programme number 'P01' is used. In the '***Clock preset***' line you can select the programme number (channel name) whose TV channel transmits this information.
If the time/date is not displayed correctly you need to choose the '***Off***' setting in the '***Clock preset***' line and set the date and time manually.

❶ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❷ Select 'T⅄' symbol with ◀ or ▶ .

❸ Select '***Installation***' using ▼ or ▲ and confirm with ▶ .

❹ Select '***Time/Date***' using ▼ or ▲ and confirm with ▶ .



Installation
Time/Date

Time	20:00
Year	2003
Month	01
Date	01

To exit press
SYSTEM MENU

❺ Check if the time in '***Time***' is correct. If required, change the time with the number buttons **0..9/abc** on your remote control.

❻ Check '***Year***', '***Month***' and '***Date***' in the same way. To move between the fields, use ▼ or ▲ .

Problem

× **Time/date is displayed incorrectly despite manual setting**
✓ With 'SMART CLOCK', time/date is transferred from the TV channel saved on 'P01' and automatically corrected.
You can either enter another TV channel for transferring the data or disable the function.
In the line '***Clock preset***' select the relevant TV channel with ◀ or ▶ .
To disable, select '***Off***'.

❼ Check the displayed settings and confirm with **OK** .
'***Stored***' will appear briefly on the screen.

❽ To end, press **SYSTEM-MENU** .

5 On-screen information

You can check or change many of the functions and settings of your DVD recorder via the system menu bar. The menu bar cannot be displayed during recording.

Symbols in the menu bar

Press **SYSTEM-MENU** to open and close the menu bar (main menu). Use ◀ and ▶ to select the relevant function. Use ▼ to confirm the function and go either to another menu or execute the function directly.
Some functions may not be available, depending on the disc inserted.

Menu bar 1

T⅄	**User preferences**
T	**Title/track**
C	**Chapter/index**
((Ϲ	**Audio language**
▭	**Subtitle language**
🎥	**Camera angle**
🔍	**Zoom**

Menu bar 2

While menu bar 1 is being displayed you can go to menu bar 2 by pressing ▶ again.

🔊	**Sound**
◁▯▷	**Frame advance**
▷	**Slow motion**
▶▶	**Fast forward**
⏱	**Search by time**

Field for temporary messages

The top left corner of the menu line contains a field for temporary messages relating to the various operating modes. This information appears briefly on the screen when certain disc functions have been activated:

shuffle	**Shuffle**
scan	**Scan**
repeat	**Repeat entire disc**

title ↻	**Repeat title**
track ↻	**Repeat track**
chapter ↻	**Repeat chapter**
A- ↻	**Repeat from A to the end**
A-B ↻	**Repeat from A to B**
🎥	**Camera angle**
locked ☹	**Child lock enabled**
resume ▶	**Resume playback**
✕	**Illegal action**

Status field

The status field shows the current operating mode (status) of the DVD recorder and the type of disc inserted. This display can be disabled.

Disc type symbols

RW	**DVD+RW**
DVD+R	**DVD+R**
DVD	**DVD-Video**
VCD	**Video-CD**
no disc	**No disc**
! error	**Error**

Operating mode symbols

● rec	**Recording**
■ stop	**Stop**
▶ play	**Playback**
❚❚ pause	**Playback-Pause**
●❚❚ pause	**Record-Pause**
▶▶ 8x	**Search forwards (8x speed)**
◀◀ 8x	**Search backwards (8x speed)**
▷ slow	**Slow motion**

Tuner information box

This field is located in the bottom left-hand corner of the screen. The aerial signal, the TV channel and the TV channel name for the selected programme are displayed.

Y	**Current channel/selected input socket**
Yx	**No signal** The TV channel is not available/the additional device is not connected or it is switched off
Y🔒	**Copy-protected signal**

'Live picture' in the 'Tuner information box'

Instead of the information about the aerial signal or the TV channel, you can watch the picture of the selected TV channel or the signal on the input socket.

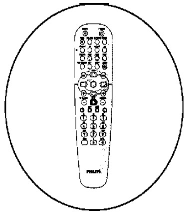
1. Select in the system menu (button **SYSTEM-MENU**) the symbol '▢' and confirm with ▶
2. Select in the line '***Live source view***' '***On***' to view this picture or '***Off***to switch this picture off.
3. End with **OK** and then **SYSTEM-MENU** .

Timer information box

This box appears above the tuner information box. When a timer recording is set, it shows the timer icon and the start time or date of the first programme to be recorded.
If no timer recording is scheduled, the current time is displayed.
This box disappears during playback of a disc or after a recording starts. However, you can access it during an OTR recording by pressing **SYSTEM-MENU** .

⏲!	**Timer starts on the day/time shown**
⏲⇥	**OTR recording runs until the stop time displayed**
⏲	**Current time** No timer event programmed

6 Playback



General notes on playback

With this DVD recorder you can play back the following systems:

- •) DVD Video
- •) (Super)Video CD Disc
- •) DVD+RW Disc
- •) DVD+R Disc
- •) DVD-RW (video mode, finalised)
- •) DVD-R
- •) CD-R
- •) CD-RW
- •) Audio CD
- •) MP3 CD
- •) Picture (Photo)-CD (JPEG-data)

You can operate the video recorder using the remote control or the buttons on the front of the DVD recorder.

Problem

× **The display will read 'PIN'**

✓ The child lock has been activated for the inserted disc. Read the sections on 'Child lock' and 'Releasing a disc' in the chapter on 'Access control (child lock).

× **The menu on the screen is showing an 'X'**

✓ Some DVD discs can be manufactured so that certain steps are required before the disc can be played, or so that only limited operation is possible during playback. When an 'X' appears on the screen the selected feature is not possible.

× **The screen is showing regional code information**

✓ Since DVD films are not normally released in all parts of the world at the same time, all DVD players have a specific regional code. Discs can be given a regional code. If the regional codes differ between the player and the disc, playback is not possible.

✓ The regional code is shown on the label on the back of the machine.

✓ The regional code does not apply to recordable DVDs.

Inserting a disc

❶ Press the **OPEN/CLOSE ▲** button on the front. The disc tray will open. While the disc tray is opening, 'OPENING' and then 'TRAY OPEN' when the tray is fully open.

❷ Carefully place the disc in the tray with the label facing up and press **PLAY ▶** or **OPEN/CLOSE ▲** . 'CLOSING' and then 'READING' will appear in the display. The information on the disc will be read.

?

How do I insert a double-sided DVD?

Double-sided discs do not have labelling over the whole surface. The labelling for each side is in the centre of the disc. To play a side its label must be facing up.

Tip

Opening/closing the tray using the remote control

You can open and close the disc tray using the remote control.

Press and hold the **STOP ■** button on the remote control until the dialog box shows 'OPENING' or 'CLOSING'.

❸ Playback starts automatically.

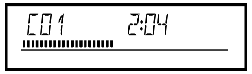
A menu may appear when a DVD is played back. If the titles and chapters are numbered, press a number button on the remote control. You can also use the ◀ , ▶ , ▲ , ▼ buttons or number buttons **0..9/abc** to select a menu item and confirm with **OK** .
You can also access the menu using **DISC-MENU** on the remote control.
For further information see 'Playing a DVD video disc'.

When a DVD+RW is played back the index overview appears. Using ▼ , ▲ , ⏮ , ⏭ select the title you want to play back.
Confirm with **OK** .
For further information see 'Playing back a DVD+RW/+R Disc'.

If playback does not start automatically, press **PLAY ▶** .
For further information see 'Playing an audio CD'.

If the '■' symbol appears in the display, start playback by pressing **PLAY ▶** .
If a menu appears on the screen, use the remote control buttons indicated on the screen to select the menu option you want (PREV= ⏮ , NEXT= ⏭) or with the number buttons **0..9/abc** .
For further information see ' Playing a (Super) Video CD'.

Playing a DVD video disc



❶ If playback does not start automatically, press **PLAY ▶** .
This will appear on the display:
title/chapter number, elapsed time.

❷ To stop playback, press **STOP ■** on the remote control or ■ on the DVD recorder.

❸ To eject the disc, press **OPEN/CLOSE ▲** on the front of the DVD recorder.

Playing a DVD+RW/ +R disc

❶ If the disc is write-protected or a finalised DVD+R disc, playback starts automatically.

❷ If playback does not start automatically, use the ▼ or ▲ button to select the title you want to play on the index screen.
You can also use the |◀◀ or ▶▶| button on the front.

❸ Press the **PLAY ▶** button.
This will appear on the display:
title/chapter number, elapsed time.

Problem

× **I can see the message 'EMPTYDISC'**
✓ The disc does not contain any recordings.

❹ To stop playback, press **STOP ■** on the remote control or ■ on the DVD recorder.

❺ To eject the disc, press **OPEN/CLOSE ▲** on the front of the DVD recorder.

?

What should I note when playing back different recording types (qualities)?
The correct recording quality '***M1***, ***M2***, ***M2x***, ***M3***, ***M4***, ***M6***',***M8***' will automatically be selected during playback.
For more information see the section on 'Selecting the recording type (picture quality)' in the chapter on 'Manual recording'.

Playing an audio CD

You can also use the DVD recorder to play audio CDs

❶ Insert an audio CD. Playback starts automatically.

Tip

Audio CD display'
If the TV is on, the audio CD screen appears automatically.

During playback, the current track number and its elapsed playing time will show on the TV screen and on the recorder display.

❷ Stop playback using **STOP ■** . The number of tracks and the total time are displayed.

Playing an MP3 CD

MP3 (MPEG1 Audio Layer-3) files are highly compressed music files. Using this technology the data volume can be compressed by a factor of 10. This means it is possible to record 10 hours of music in CD quality on a single CD-ROM.

When creating MP3 CDs please note the following:
File system: ISO9660
Directory structure: maximum of 8 levels
Formats: *.mp3
Filenames: maximum of 12 characters (8+3)
Maximum of 32 albums, 999 titles
Supported sampling frequencies: 32, 44.1, 48 (kHz). Music with sampling frequencies other than these will be skipped.
Supported bit rates: 32, 64, 96, 128, 192, 256 (kbit/s)
ID3 Tag: Version 1, 1.1. In later versions the directory name is displayed as the album and the filename as the title.

Important notes for playback:
Only the first session of a multi-session CD will play back.

❶ Insert an MP3 CD. Playback starts automatically.

Tip

MP3 CD display
If the TV is on, the MP3 CD screen appears automatically.

During playback, the current track number and its elapsed playing time will show on the TV screen and on the recorder display.
During stopped playback (**STOP ■** button) the numbers of the albums will show on the TV screen and on the display.

Further information on the album, track and artist will also be displayed if included in the ID tag.

❷ Stop playback using **STOP ■** . The number of albums is displayed in the display.

Tip

Additional playback features
Using |◀◀ or ▶▶| select the next or previous title.

You can also use the **T/C** button to select titles and albums.
❶ Press the **T/C** button and use the ▶ or ◀ button to select the 'T' symbol for title or 'C' for chapter.
❷ Use the ▼ or ▲ buttons or the number buttons **0..9/abc** on the remote control to select the number of the title/chapter.

You can also use the repeat functions (**PLAY MODE** button).

Playing a (Super) Video CD

(Super) Video CDs may be equipped with PBC (Play Back Control). This means that special playback functions (menus) can be directly selected. The video CD must be PBC compatible (see CD case).
'PBC' is active in the default settings.

❶ Insert a (Super) Video CD.
If the '■' symbol appears in the display, start playback by pressing **PLAY ▶** .

❷ If a menu appears on the screen, use the remote control buttons indicated on the screen to select the menu option you want (PREV= **|◀◀** , NEXT= **▶▶|**) or with the number buttons **0..9/abc** .
If a PBC menu consists of a list of titles, you can select a title directly.

❸ Use **RETURN** to go back to the previous menu

❹ Stop playback using **STOP ■** .

7 Additonal playback features

Changing to another title/chapter

If there is more than one title or chapter on a disc you can change to another title or chapter as follows. However if there are several chapters within a title, these will be selected. The title can then still be selected via the menu bar.

❶ During playback, press **▶▶|** to go to the next title/chapter. Press **|◀◀** to return to the start of the current title/chapter. Press **|◀◀** twice to return to the start of the previous title/chapter.

Tip

Use the T/C (title/chapter) button

❶ Press **T/C** (title/chapter) and then use ▲ or ▼ to select the appropriate title.
Make sure the symbol 'T' (title) is selected in the menu bar.

❷ Use **T/C** to select chapters within a title. Press **T/C** and use ▶ to select the 'C' symbol (chapter).
Now select the appropriate chapter with ▲ or ▼ .

Searching a disc

You can search the disc for a recording at 4x, 8x or 32x playback speed. Other speeds can only be selected via the menu bar ('▶▶').

❶ During playback, press and hold **|◀◀** (reverse) or **▶▶|** (forwards) to switch to the search feature. You can switch between the playback speeds using **|◀◀ / ▶▶|** .

❷ To continue playback, press **PLAY ▶** twice at your chosen location.

Problem

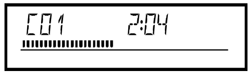
× **No sound**

✓ The sound is switched off in search mode. This is not a fault in your machine.

Tip

Search feature via menu bar

❶ During playback press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
❷ Select the '▶▶' symbol using ▶ or ◀ and confirm with ▼ .
❸ You can now use the ◀ or ▶ button to select different forward and backward search speeds.
❹ If necessary, switch the menu bar off with the **SYSTEM-MENU** button.
❺ To continue playback, press **PLAY ▶** twice.



Still picture

❶ During playback, press **PAUSE II** to stop playback and display a still picture.

Frame advance via menu bar
❶ During a still picture press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
❷ Select the '◂▯▸' symbol using ▶ or ◀ and confirm with ▼ .
❸ You can now use the ◀ or ▶ button to go forwards or backwards one frame at a time.
❹ If necessary, switch the menu bar off with the **SYSTEM-MENU** button.

Tip

❷ To continue playback, press **PLAY ▶** .

Slow motion

❶ During playback press **PAUSE II** on the remote control. Now hold down **I◀◀** or **▶▶I** to switch to slow motion.

❷ You can switch between different speeds using **I◀◀** or **▶▶I** .

Slow motion via menu bar
❶ During playback press **PAUSE II** and then **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.
❷ Select the '▷' symbol using ▶ or ◀ and confirm with ▼ .
❸ You can now use the ◀ or ▶ button to select different forward and backward slow motion speeds.
❹ If necessary, switch the menu bar off with the **SYSTEM-MENU** button.

Tip

❸ To continue playback, press **PLAY ▶** twice.

Search by time

Using this feature you can select where playback should start (select elapsed time).

❶ During playback press **SYSTEM-MENU** on the remote control. The menu bar will appear at the top of the screen.

❷ Select the '⏲' symbol using ▶ or ◀ and confirm with ▼ . Playback is stopped and a box appears on the screen showing the elapsed time.

❸ Enter the start time with the digit keys **0..9/abc** from where playback should start.

❹ Confirm with **OK** .

× **The time entered will flash on the screen**
✓ The selected title is shorter than the time entered. Enter a new time or cancel the function by pressing **SYSTEM-MENU** .

Problem

❺ Playback starts at the time you entered.

Repeat/Shuffle play

You can mark entire sections or the whole disc for endless playback. Depending on the type of disc (DVD video, DVD+RW, video CD) you can select a chapter, title or the entire disc.

❶ Select the desired chapter, title or the entire disc and start playback.

❷ During playback, press **PLAY MODE** . By pressing **PLAY MODE** again you can chose from the following options:
•) 'chapter': repeat chapter (DVD only)
•) 'title': repeat track/title
•) 'repeat': repeat entire disc (Video CD, Audio CD only)
•) 'shuffle': Shuffle
•) Display disappears: no repeat

❸ To end the repeat, press the **STOP ■** button.
You can also keep pressing the **PLAY MODE** button until the displays disappear.

Repeating a passage (A-B)

You can repeat a particular passage within a title/chapter. You need to indicate the start and end of the passage.

❶ During playback press **PAUSE II** at the start point.
You will see a still picture.

❷ Keep pressing **PLAY MODE** until 'A-' appears on the screen.
The start point is now saved.
Press **PLAY ▶** to start playback.

❸ When the end point is reached press **OK** . 'A-B' appears on the TV screen. Playback now takes place within these points.

❹ To end the repeat, press the **STOP ■** button.
You can also keep pressing the **PLAY MODE** button until the displays disappear.

Scan feature

This feature plays back the first 10 seconds of each chapter (DVD) or track (CD).

❶ During playback, press **PLAY MODE**. Select 'scan' using **PLAY MODE**.

❷ After 10 seconds the DVD recorder switches to the next chapter/index. To start playback at the relevant chapter/index press **STOP ■** and then **PLAY ▶**.

Camera angle

If a DVD contains scenes that have been shot from different camera angles you can select these camera angles for playback.

❶ During playback, press **PAUSE II**. You will see a still picture.

❷ Press **SYSTEM-MENU** and select the '🎥' icon using ▶.

Problem

✗ **The '🎥' symbol will be hidden**

✓ The selected scene has been shot from only one camera angle. This feature is therefore not available. For more information please read the cover of your DVD disc.

❸ Select the required camera angle with ▼ or ▲. You can also directly enter the number with the number buttons **0..9/abc**.

❹ After a short time, playback will resume from the new camera angle. The '🎥' symbol will remain visible until a scene starts for which there is only one camera angle.

Zoom feature

The Zoom feature allows you to enlarge the video image and pan through the enlarged image.

❶ During playback, press **ZOOM**. The DVD recorder switches to 'PAUSE'. You will see a still picture.

❷ Select the required zoom factor using ▼ or ▲.

❸ When '***press OK to pan***' appears on the screen, the zoom process is complete.

❹ Press **OK**. Using ▲, ▼, ▶, ◀ select the part of the image you wish to view.

❺ Confirm with **OK**.

❻ To stop the feature, press **PLAY ▶** and then **SYSTEM-MENU**.

Select the audio language

Many pre-recorded DVD discs have more than one audio language. The language initially selected for playback will be the one you selected when you first set up the DVD recorder. However you can change the audio language of the inserted disc at any time.
You can change the audio language either using the menu of the inserted disc (**DISC-MENU** button) or the **AUDIO** button. The audio languages for DVD playback in the two menus may be different. Please note that with some DVDs the audio language and/or subtitle language can be changed only via the DVD menu.

❶ During playback press **AUDIO**.

❷ Select the required audio language using ▼ or ▲. You can also enter the number directly using the number buttons **0..9/abc**.

❸ Play continues in the new audio language.

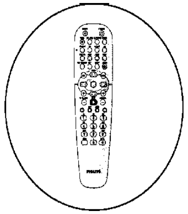
Subtitles

Many pre-recorded DVD discs have more than one subtitle language. The language initially selected for playback will be the one you selected when you first set up the DVD recorder. However you can change the subtitle language of the inserted disc at any time.
You can change the subtitle language either using the menu of the inserted disc (**DISC-MENU** button) or the **SUBTITLE** button. The subtitle languages in the menus may differ.

❶ During playback press **SUBTITLE**.
Select the required subtitle language using ▼ or ▲. You can also enter the number directly using the number buttons **0..9/abc**.
You can switch off subtitles again with **0** or by pressing '***off***'.

❷ Playback continues in the new subtitle language.

8 Disc Manager (DM)



General information

The 'Disc Manager' is an integrated database in the DVD recorder that remembers all recordings made by this DVD recorder. This gives you a complete overview of your entire video collection at the touch of a button. The Disc Manager gives you quick and easy access to every recording **made with this DVD recorder**. The Disc Manager also tells you which film was recorded on which disc and how many unrecorded minutes remain on the discs.
And: You can go automatically to the beginning of the selected recording and start playback.

How many discs can I save in the Disc Manager?
You can store up to 999 discs on this DVD recorder. The maximum number of titles is more than 9,000. The maximum number of titles per disc is 49.
?

Caution when recording with other DVD recorders
Don't use a disc stored in the Disc Manager for recording on other DVD recorders. If you use a disc to record on another DVD recorder, then this disc will no longer be recognised by the Disc Manager. In this case, delete the disc from the Disc Manager's memory and then add it after it has been recorded.

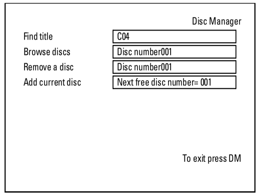
Adding 'child-proof discs'
If you want to add child-proof discs you need to enter the PIN code.
Tip

Adding a disc to the Disc Manager

You can only add DVD+RW or DVD+R discs to the Disc Manager since other discs do not hold any information on the titles or lengths of the recordings. These discs have to be at least once recorded in the DVD-Recorder. A table of content have to be available.
DVD+R discs can also be finalised. Other discs cannot be added to the Disc Manager.

Recordings are saved automatically
On a disc that has been added to the Disc Manager, you can make new recordings as often as you like using this DVD recorder. The titles of these recordings will be stored in the Disc Manager automatically.
Tip

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.



Disc Manager
Find title C04
Browse discs Disc number001
Remove a disc Disc number001
Add current disc Next free disc number= 001
To exit press DM

❷ Insert a DVD+RW/+R disc in the DVD recorder.

× **When I insert a disc I see a number on the screen in the index picture screen in the top left-hand corner**
✓ You have inserted a disc that has already been registered by the Disc Manager.
Problem

❸ Press the **DISC MANAGER** button on the remote control.

❹ Select '***Add current disc***' using ▲ or ▼ and confirm with ▶ .

❺ Confirm with **OK** .
The disc number will be added to the Disc Manager.

❻ The disc number is then displayed and the disc tray opens automatically.

❼ The disc is now stored in the Disc Manager under the displayed disc number.
Please write this number on the disc and on the cover.

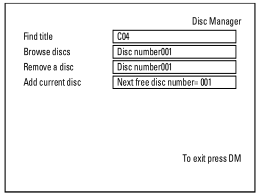
Why do I need to label the discs?
When searching for unrecorded free space or available recordings, you will asked to insert the appropriate discs (disc numbers).
?

❽ To end, press **DISC MANAGER** .

The DVD recorder will immediately recognise that this disc is saved in the Disc Manager. When this disc is inserted the disc number will appear in the title overview in the top left-hand corner.

Removing discs from the Disc Manager

Every DVD+RW/+R is stored with a number in the Disc Manager (DM). You can remove this disc number from the Disc Manager to use the Disc Manager's memory for new discs or to remove damaged discs from memory.



Disc Manager
Find title C04
Browse discs Disc number001
Remove a disc Disc number001
Add current disc Next free disc number= 001
To exit press DM

❶ Press **DISC MANAGER** on the remote control.

❷ Select '***Remove a disc***' using ▲ or ▼ and confirm with ▶ .

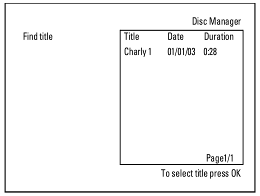
❸ Select the disc number with ▲ or ▼ and confirm with **OK** .

Disc contents are not deleted.
The disc is only removed from the Disc Manager's memory. Its contents remain unchanged.
Tip

❹ To end, press **DISC MANAGER** .

Searching for a title in the Disc Manager

This function can be used to quickly and easily find and play back a recording saved in the Disc Manager.


Find title

Disc Manager

Title	Date	Duration
Charly 1	01/01/03	0:28

Page1/1

To select title press OK

1. Press **DISC MANAGER** on the remote control.
2. Select '***Find title***' using ▼ or ▲ and confirm with ▶ .
3. A list of the titles of all recordings stored in the Disc Manager (DM) will appear on the TV screen.

What do the displays on the screen mean?
'***Title***' = Title
'***Date***' = Date of the recording
'***Duration***' = Length of the recording

Tip

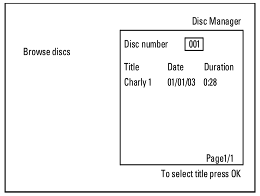
4. Select the title that you want to play back with ▼ or ▲ .
5. Confirm with ▶ . The DVD recorder will jump to the start of the selected recording.

× **I see the message '*Insert disc number*' on my screen**
✓ The selected recording is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc. After a brief check, the DVD recorder will jump to the start of the selected recording.

Problem

Searching discs

You can easily search for the title of a recording stored in the Disc Manager. To do this, the appropriate disc does not have to be in the DVD recorder.


Browse discs

Disc Manager

Disc number 001

Title	Date	Duration
Charly 1	01/01/03	0:28

Page1/1

To select title press OK

1. Press **DISC MANAGER** on the remote control.
2. Select '***Browse discs***' using ▼ or ▲ .
3. Confirm with ▶ . The screen will show the contents of the last Disc Manager disc used.
4. Use ▲ or ▼ to select a different disc number if necessary and confirm with ▶ . You can also enter the disc number directly with the **0..9/abc** buttons on the remote control.

What do the displays on the screen mean?
'***Title***' = Title
'***Date***' = Date of the recording
'***Duration***' = Length of the recording

?

5. Press ▲ or ▼ to select the desired title.
6. Confirm with **OK** .

× **I see the message '*Insert disc number*' on my screen**
✓ The selected recording is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc.

Problem

7. The DVD recorder searches for the start of the appropriate recording.

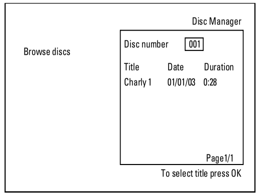
Searching for a blank section

You can search for space for a new recording on the disc (at least 1 minute of blank space), for example at the end of existing recordings.
This only works with discs which have already been stored in the Disc Manager.

1. Press **DISC MANAGER** on the remote control.
2. Select '***Browse discs***' using ▲ or ▼ .
3. Confirm with **OK** . A list of the recordings on the disc you have selected will appear on the TV screen.
4. Use ▲ or ▼ to select a disc (disc number) on which there is enough space for the recording.

How can I see how much space is available for the recording?
The space available is designated as '***Empty***'. The time is displayed next to the title '***Empty***'. You can use the **REC MODE** button to change the recording mode (recording time).
How can I choose the titlel '*Empty*' if there were many recordings on the disc?
In this case press ▶ and then select with ▼ , ▲ the title '***Empty***'.

?


Browse discs

Disc Manager

Disc number 001

Title	Date	Duration
Charly 1	01/01/03	0:28

Page1/1

To select title press OK

5. Select the title '***Empty***' with ▲ or ▼ .
6. Confirm with **OK** .

× **I see the message '*Insert disc number*' on the screen.**
✓ The blank space is located on the Disc Manager disc with the displayed disc number. Please insert the appropriate disc.

Problem

The DVD recorder rewinds to the beginning of that particular part and automatically switches to Stop.

9 The 'Digital Photo Manager'

Using the 'Digital Photo Manager', you can view, modify, and save JPEG pictures (*.JPG) on a memory card, Picture CD, DVD, or a CD ROM.
In addition, you can store the pictures in a so-called album in a specific order, yet without changing the order in which the pictures are stored on the memory card.
Moreover, you can view the pictures in a slide show at adjustable intervals.
Store the pictures on a DVD+RW/+R so you can view them on a DVD player.

How many pictures can be organized from the DVD-Recorder?
Since the storage size of a JPEG picture depends on different parameters (quality, picture information, JPEG compression, resolution of the camera,...) the limitation is only the available storage capacity.
You can store up to a maximum of 999 photos in one album on a DVD+RW/+R or memory card.
In case you want to store pictures on a medium that cannot be recorded by the DVD recorder (Picture CD, CD-ROM, finalised DVD+R, DVD), you can store up to a maximum of 100 pictures per album in 20 albums. These albums will be stored in the internal memory with the appropriate disc ID-number. With this number the allocation to the different disc is possible.

Select from the following chapters:

'The PC (PCMCIA) card',
to install or remove the memory card.

Showing JPEG pictures from a roll' ,
in order to view and modify the pictures and create slide shows from the roll.

'Advanced editing of JPEG-pictures,
for advanced editing options such as color, sharpness...

' Creating an album ',
to arrange pictures from different rolls in a definite order and to create a slideshow from the album.

'Making a DVD compatible slide show',
Make a slide show from the roll/album for viewing on a DVD-player.

' Storing rolls/albums on a DVD+RW/+R' ,
Store your JPEG pictures for archiving on a DVD+RW/+R.

'Changing roll settings' ,
to modify the rolls to your personal preferences.

'Changing album settings' ,
to modify the albums to your personal preferences. erstellen.

' Changing the media settings',
to modify the storage media (DVD+RW/+R, memory cards) to your personal preferences.

What is the difference between a '*Roll*' and an '*Albums*'?
'Roll'
A directory containing JPEG pictures. It is comparable with a conventional 35mm film for cameras. Rolls will be created automatically from the digital cameras.
'Albums'
A binary file containing references to the pictures on the rolls. It is comparable with a conventional photo album that may contain the pictures of different films (rolls).
You can delete an album without deleting the picturesof the rolls.

The PC (PCMCIA) Card

In this DVD-Recorder you can use the following types of memory cards with an adapter:
•) SD memory cards
•) Multimedia Card
•) CompactFlash
•) SmartMedia
•) Memory Stick/Menory Stick pro
•) Micro Drive
•) xD Picture Card

The DVD-Recorder can read/write files, which were stored on memory cards using the file systems FAT 8, FAT 12, FAT16 and FAT 32. This means that it can handle memory cards larger than 2 GB.

Inserting the PC Card

❶ If necessary, insert the memory card into the PC Card adapter first.
The label must be facing up.
The contacts must be facing the device.

❷ Insert the PC Card into the media slot in the front of the recorder until the EJECT button sticks out of the device front completely. Press this button to remove the PC Card.

Removing the PC Card

❶ Press the EJECT button next to the PC Card.

❷ This will push the card out of its slot.
If the card remains in the slot, insert the PC Card once again and press the EJECT button again.

Warning !
Insert/Remove the PC Card only when there is no access to the memory card. This could damage the memory card.

You can recognise the access by:
•) A moving disc symbol lights up on the top left corner of the screen
•) The warning '*Do not remove media*'appears on the screen.
If you were not sure, press in the 'Digital Photo Manager' the button PHOTO. This will take you directly into the '*Media menu*' screen. You can also switch the DVD-Recorder off with the STANDBY ⏻ button.

Showing JPEG pictures from a roll

The DVD recorder can read JPEG pictures stored on a CD-ROM, Picture CD, memory card, or a DVD and write them on a DVD+RW/+R or memory card.

Please observe the following:
•) The file extension has to be '*.JPG' and not '*.JPEG'.

These pictures must be stored in the root directories or in a subdirectory called 'DCIM' in folders. These will be recognized by the DVD recorder as rolls (comparable with a 35mm roll for cameras). You can select the directories (folders) as rolls in the '***Media menu***'.

•)This device is compatible with still pictures (JPEG)

•)It can only display DCF-standard still pictures or JPEG pictures e.g. TIFF. It cannot play back moving pictures, Motion JPEG, and other formats, or pictures in formats other than JPEG, or pictures associated with sound e.g. AVI-files.

1. Insert the medium you want to use (CD, DVD+RW/+R, memory card).
2. Press **PHOTO** on the remote control. The '***Media menu***' will appear.
3. Use ▼ or ▲ to select the medium you want to process (disc or memory card). If you did not insert the corresponding medium (disc or memory card), a warning sign will appear above the symbol on the left hand side of the screen.
4. Confirm with ▶ .
5. Select '***Roll***' using ▼ or ▲ and confirm with ▶ .
6. You will see an overview with the first picture of each roll that contains pictures. The display and the description of the roll will depend on the camera or the computer program used to create this roll.
7. Select the desired roll using ▼ or ▲ and confirm with **OK** .
8. The data will be read and then an overview of the stored pictures will be displayed.
9. You can select a picture for viewing or processing with ◀ , ▶ , ▼ , ▲ .

Tip

Fast browsing trough the pictures
With ▶▶I or I◀◀ you can switch one page forward or backward.
You can also select a picture with the number buttons **0..9/abc** on the remote.

10. Press **OK** to select the desired picture.
11. The picture will be displayed as a full picture on the screen.

Editing JPEG pictures

1. On the corresponding pictures press **SELECT** to select them for processing.
   The picture frame appears in a different color.
   Press **SELECT** on the selected pictures again to deselect them.
2. Keep pressing ▲ until the menu bar is selected. Select one of the displayed functions with the ▶ or ◀ button.

Tip

Which options are available?
'***Menu***': leave the menue
'***Play***': Starts the slide show
'***Erase***': Erases the selected pictures
'***Rotate***': Rotates the selected pictures by 90
'***Copy***': copies the selected pictures on the other loaded media (from memory card to DVD+RW/+R or vice versa)
'***Select all***': Selects all pictures
'***Cancel***': Cancels the changes

Using the buttons on the remote
'***Play***': Button **PLAY▶**
'***Erase***': Button **CLEAR** and then **OK**
'***Rotate***': Button **ANGLE**

Slide show

You can display JPEG pictures in the selected roll automatically one after the other at adjustable intervals.

Starting the slide show

1. Press **PLAY▶** to start the slide show.

Interrupting the slide show

1. Press **PAUSE II** . This will stop the automatic display of the pictures.
2. Press **PLAY▶** to resume the slide show.

Closing the slide show

1. Press **STOP ■** . The picture overview will appear.

Changing the slide show settings

❶ Press **SYSTEM-MENU** during playback.

❷ Select one of the displayed functions with the ◀ or ▶ button.

Which options are available?

'*Overview*': Returns to the picture overview. Has the same function as **STOP ■**

'*Play*': Resumes the slide show. Has the same function as **PLAY ▶**

'*Timer*': Select one of various speeds by pressing ▼
Confirm with **OK** .
Start the slide show with **PLAY ▶** .

'*Repeat*': Switches repeat playback of the slide show on and off

Using the buttons on the remote

'*Repeat*': Button **PLAY MODE**
Bild vergrößern: Button **ZOOM**
Bild verändern: Button **EDIT**

Tip

Advanced editing of the JPEG pictures

You can edit the pictures in the DVD recorder and then store them back on the memory card or a DVD+RW/+R. The original picture remains unchanged, and the modified one is additionally stored on the medium.
Please make sure the memory card or DVD+RW/+R is not write-protected and has enough storage space.

❶ Press at the required picture the button **EDIT** .

❷ Select one of the displayed functions with the ◀ or ▶ button.

Using the buttons on the remote

ANGLE : Rotates the picture
ZOOM : Enlarge the picture
STOP ■ : Returns to the picture overview
CLEAR : Discard the changes. The picture will be reloaded.

Tip

'*Overview*'

Returns to the picture overview.

'*Rotate*'

Rotates the picture by 90 each time you press **OK** .

'*Flip*'

Mirrors the picture along its vertical axis when you press **OK** .

'*Zoom*'

Using this function, you can enlarge the picture and pan through the enlarged picture.

❶ Press **OK** to activate the zoom function.

❷ Select the area to be enlarged with ◀ , ▶ , ▼ , ▲ .

❸ You can press **ZOOM** to enlarge the selected area at several steps.

❹ Press **OK** to return to the normal picture size.

'*Filters*'

Using this function, you can modify the picture properties.

❶ Press ▼ and select one of the displayed functions using ▼ or ▲ .
Confirm with ▶ .

Which options are available?

'*Sepia*: Displays the entire picture in brown colors. It gives the picture an 'antique' appearance.

'*Negative*': Converts the picture into a black-and-white negative.

'*Colour negative*': Converts the picture into a color negative. Comparable to a color negative film.

'*Black & white*': Converts the picture into a black-and-white picture.

'*Soften*': Use this function to reduce picture sharpness in three steps, from edge blurring to a visible blur.

Tip

❷ Keep pressing ▲ until the menu bar is selected.

'*Colour*'

Using this function, you can change the red, green, and blue color components of the picture.

❶ Press ▼ .

❷ Use ▼ or ▲ to select the corresponding color control.

❸ Change the color using ◀ or ▶ .

❹ Keep pressing ▲ until the menu bar is selected.

'*Reset*'

This setting will appear only if changes have already been made to the picture. If you want to discard the changes, confirm with **OK** .

'*Save*'

This setting will appear only if changes have already been made to the picture. If you want to save the changes, confirm with **OK** .

Creating an album

You can store pictures contained in a memory card or DVD+RW/+R in a so-called '***Albums***' in a different order. Albums are binary files containing information on the orientation and storage location of the pictures.
Albums from a medium that cannot be recorded by the DVD recorder (Picture CD, CD-ROM, finalised DVD+R), will be stored in the internal memory of the DVD recorder. You can store up to a maximum of 100 pictures per album in 20 albums.

Adding pictures to an album

❶ Select '***Albums***' in the '***Media menu***' using ▼ or ▲ and confirm with ▶ .

❷ An overview of the albums you already created will appear. Select '***New album***' with ▼ to create a new album.

❸ Press ▶ . The menu '***Album Settings***' will appear.
In a new album, the line '***Add photos***' is already highlighted.

❹ Confirm with **OK** .

❺ The roll overview will appear.

❻ Use ▼ or ▲ to select the roll from which you want to add pictures to the album.

❼ Confirm with ▶ .
The picture overview will appear.

❽ Use ◀ , ▶ , ▼ , ▲ to select the pictures you want to add to the album.

❾ Confirm each selected picture with **SELECT** . Do not pay attention to the order of the pictures. You can change it later in the album.

Tip

Select all pictures
If you want to store many pictures in the album, select '***Select all***'.
Then use **SELECT** to select the pictures you don't want to add to the album.
These pictures will be deselected.

❿ Keep pressing ▲ until the menu bar is highlighted.

⓫ Select '***Done***' with ◀ or ▶ to add all selected pictures to the album.

⓬ Confirm with **OK** .
The album will be created. 'SAVING' will appear in the display while the album is created.
Do not remove the medium from the device!

⓭ The menu '***Album Settings***' will then automatically appear.

⓮ To add additional pictures, use ▼ to select '***Add photos***' and confirm with **OK** .

⓯ Repeat steps ❺ to ⓮ until the album contains all the desired pictures.

Changing the picture order within an album

You can change the order of the pictures within an album as you wish. The order of the pictures of the rolls remains unchanged.

❶ Select '***Albums***' in the '***Media menu***' using ▼ or ▲ and confirm with ▶ .
An overview of the albums you already created will appear.

❷ Press ▶ to select the desired album. The '***Album Settings***' menu will appear.

❸ Select '***Overview***' by pressing ▼ . The '***Overview***' option can be found on the second menu page

❹ Confirm with **OK** .

❺ Use ▼ , ▲ , ◀ , ▶ to select the picture you want to move to a different position.

❻ Press **SELECT** . The picture frame appears in a different color.

❼ Keep pressing ▲ until the menu bar is highlighted.

❽ Select '***Move***' using ◀ or ▶ and confirm with **OK** .

❾ Use ▼ , ▲ , ◀ , ▶ to select the position **before** which the desired picture is to be moved.

❿ Confirm with **OK** . The picture will be inserted.

Editing pictures in an album

You can also erase, rotate, or hide pictures in an album. These changes will only affect the album. The pictures on the disc or the memory card will remain unchanged.

❶ Select the pictures you want to change in the '***Album overview***' using **SELECT** .

❷ Keep pressing ▲ until the menu bar is highlighted.

❸ Select one of the displayed functions with the ◀ or ▶ button.

What do the individual functions mean?

'***Menu***': Closes the current menu
'***Play***': Starts the slide show of the album
'***Move***': Changes the order of pictures within an album.
'***Erase***': Erases the pictures from an album. The picture on the media remains unchanged.
'***Rotate***: Rotates pictures by 90
'***Hide***': Hides pictures for the slide show
'***Select all***': Selects all pictures
'***Cancel***': Discards all changes

Using of the buttons on the remote

'***Play***': Button **PLAY MODE**
'***Erase***': Button **CLEAR**
'***Rotate***': Button **ANGLE**

Changing album settings

You can adjust various album settings to your individual needs. You can change the name and date of an album. Moreover, you can copy or delete the album.

Changing the cover picture

You can change the picture used to represent a certain album in the '***Album overview***'. As a rule, the first picture of an album is used as the cover picture. However, you can use any picture in the album as a 'cover picture'.

❶ Select '***New cover photo***' in the '***Album Settings***' using ▼ , ▲ and confirm with **OK** .
The album will be read and a picture overview of the album will appear.

❷ Use ▼ , ▲ , ◀ , ▶ to select the picture you want to use as the 'cover picture'.

❸ Confirm with **OK** .
The new 'cover picture' appears in the bottom left corner of the '***Album Settings***'.

Changing the album name

You can re-enter or change the name of an existing album.

❶ Select the '***Album name***' in the '***Album Settings***'using ▼ , ▲ and confirm with ▶ .

❷ Type the new album name using the **0..9/abc** buttons like you would do on a cellular phone. You can also move to the position where you want to enter or change a character using ◀ , ▶ . Change the characters with ▼ , ▲ .

How can I enter the characters with the buttons 0..9/abc ?

Press a number button as often as the required character or the number appears. You can enter language dependent characters with the buttons ⏮ or ⏭ on the corresponding character e.g.: 'ä', button **2** for 'a' and then with ⏭ as often as 'ä' appears.
For special characters press **1** more the once .
The position for the following character will be selected automatically.
To enter a space press the **1** button.
To switch over to upper case characters press **SELECT** .
To erase a character press **CLEAR** .

❸ To end, press **OK** .

Changing the album date

❶ Select '***Date***' in the '***Album Settings***' using ▼ , ▲ and confirm with ▶ .

❷ Select the field you want to change using ◀ , ▶ .

❸ Change the date using ▼ , ▲ or use the **0..9/abc** buttons to enter the numbers.

❹ Confirm the changes with **OK** .

Calling the album overview directly

❶ Select '***Overview***' (second page) in the '***Album Settings***' using ▼ , ▲ and confirm with **OK** .

❷ This will take you directly into the album overview where you can make changes.

Copying an album

Using this function, you can:

- •) Copy albums created on a memory card to a DVD+RW/+R
- •) Copy albums created on a DVD or a CD-ROM to a memory card. This will also store the pictures used for the album.

❶ Select '***Copy album***' (second page) in the '***Album Settings***' using ▼ , ▲ and confirm with **OK** .

×**It is not possible to select '*Copy album*'**

✓

✓ There is no media in the DVD-Recorder to store an album/'***Roll***'. Insert a DVD+RW/+R disc or insert a memory card.

Problem

Erasing an album

It is also possible to erase an album. The pictures within an album will not be deleted and shall remain on the storage medium (disc or memory card) unchanged.

❶ Select '***Remove album***' (second page) in the '***Album Settings***' using ▼ , ▲ and confirm with **OK** .

❷ If you really want to erase the album, press **OK** to confirm, otherwise cancel the function using ▲ .

❸ The overview of all albums will then be displayed.

ENGLISH

Changing roll settings

You can adjust various roll settings to your individual needs. You can change the name and date of a roll.

Changing the rolls name

You can re-enter or change the name of an existing roll.
The name on the storage media will not be changed. The new name will be stored additionally.

❶ Select '***Roll name***' in the menu '***Roll Settings***' using ▼ , ▲ and confirm with ▶ .

❷ Type the new roll name using the **0..9/abc** buttons like you would do on a cellular phone. You can also move to the position where you want to enter or change a character using ◀ , ▶ .

❸ Enter the new name with the buttons ▼ , ▲ .

Enter the characters with the buttons 0..9/abc

Press a number button as often as the required character or the number appears. You can enter language dependent characters with the buttons |◀◀ or ▶▶| on the corresponding character e.g.: ä, button **2** for a and then with ▶▶| as often as ä appears.
For special characters press **1** more the once .
The position for the following character will be selected automatically.
To enter a space press the **1** button.
To swith over to upper case characters press **SELECT** .
To erase a character press **CLEAR** .

Tip

❹ To end, press **OK** .

Changing the rolls date

❶ Select '***Date***' in the menu '***Roll Settings***' using ▼ , ▲ and confirm with ▶ .

❷ Select the field you want to change using ◀ , ▶ .

❸ Change the date using ▼ , ▲ or use the **0..9/abc** buttons to enter the numbers.

❹ Confirm the changes with **OK** .

Calling roll overview directly

❶ Select '***Overview***' in the '***Roll Settings***' using ▼ , ▲ , and confirm with **OK** .

❷ This will take you directly into the roll overview where you can make changes.

Deleting a roll

WARNING!
This procedure cannot be reversed, since the rolls will also be erased from the corresponding media. Deleting a roll will also affect any album that uses this pictures contained in a roll.
Therefore, apply this function with particular care.

❶ Select '***Erase roll***' in the menu '***Roll Settings***' using ▼ , ▲ , and confirm with **OK** .

❷ If you really want to delete the roll, press **OK** to confirm, otherwise cancel the function using ▲ .

❸ The overview of all rolls will then be displayed.

Storing rolls/albums on a DVD+RW/+R

If you want to store the JPEG pictures from the rolls/albums on a DVD+RW/+R, you must first prepare the disc.

Preparing a DVD+RW/+R

❶ Press **PHOTO** on the remote control. The media menu will appear.

❷ Use ▼ or ▲ to select the disc alone as a medium. If you did not insert a disc, a warning sign will appear above the symbol on the left hand side of the screen.

❸ Press ▶ .

❹ Select '***Media settings***' using ▼ and confirm with **OK** .

❺ Use ▼ or ▲ to select whether you want to store '***Photo only***'or '***Video & photo***' together on this disc.
Please note, that DVD+R's or memory cards can only be prepared for '***Photo only***'.

What is the difference?
'***Photo only***'
The DVD+RW/+R will be prepared so that only pictures can be stored on the entire disc (4,4 GB).
'***Video & photo***'
On the DVD+RW/+R a space (650 MB) will be reserved for storing pictures additionally to movies. So you can store the appropriate photos after the movie.
A DVD+R can not be prepared for '***Video & photo***'

How long does this process last?
To prepare a disc for '***Video & photo***', a new DVD+RW has to be formattet first. This can take up to 25 minutes. You can speed up the process, if you use a prerecorded disc.

❻ Confirm with **OK** .

❼ **WARNING!**
All data on the disc will be erased.
If you want to continue, press **OK** .
To cancel the process, press ▼ or ▲ .

❽ 'PREPARING' will appear in the display until the preparation is complete.

❾ If the disc has been successfully prepared, the '***Media settings***' menu menu will appear, indicating the available storage space. (4.4 GB for '***Photo only***'/650MB for '***Video & photo***')

Transfer the photos to a DVD+RW/+R

Using this function, you can store the pictures on the DVD+RW/+R in the same format as on a memory card. You can handle these pictures as if they were stored on a memory card.
If you want to play this DVD on a computer drive, ensure that the operating system of your computer can handle the file system UDF 1.5 (Universal Disc Format).
If you want to play back a DVD+RW/+R on a DVD player, read section ' Making a DVD compatible slide show '.

❶ Press **PHOTO** on the remote control. The '***Media menu***' will appear.

❷ Use ▼ or ▲ to select the disc with the memory card (last symbol).
If you did not insert a disc, a warning sign will appear above the symbol on the left hand side of the screen.

❸ Press ▶ .

❹ Use ▼ or ▲ to select whether you want to copy the complete memory card into a roll or to create additionally to the roll an album that contains the same pictures as the roll. The creation of the album makes edits easier. only or the album as well.
Storing the album will also store the corresponding pictures.

❺ Confirm with **OK** . 'SAVING' will appear on the display.
A bar with a time display will appear on the screen until the process has been completed.

Making a DVD compatible slide show

Using this function, you can record the pictures in such a way, that you can also view the slide show from a film or an album on a DVD player.
The slide show will be stored on the DVD+RW/+R as a video title. If you want to store additionally to the video title the photos in the JPEG format, you must prepare the DVD+RW so that you can store both pictures and videos. Die Dia-Show wird auf der DVD+RW/+R als Videotitel gespeichert. Möchten Sie auf einer DVD+RW zusätzlich zu dem Videotitel auch die Fotos im JPEG-Format speichern, müssen Sie die DVD+RW so vorbereiten, See section 'Preparing a DVD+RW/+R'.
On a DVD+R only photos or only videos can be stored. A combination of JPEG photos and video is not possible.

Making a slide show from a roll

Each roll will be stored as one video title on the DVD+RW/+R.
If you want to make a video title from different rolls, you have to create an album first. Then you can store the album as a video title on the DVD+RW/+R.

❶ Select in the '***Media menu***' screen the memory card (symbol in the middle) and confirm with ▶ .

❷ Select the line '***Rolls***' and confirm with ▶ .

❸ Select with ▼ , ▲ , the roll from which you want to make a video title.

❹ Press ▶ the '***Roll Settings***' menu will appear.

❺ Select the line '***Make video title***' using ▼ , ▲ an confirm with **OK** .
'SAVING' will appear in the display and the screen will show the time left until completion.
The new roll will be stored on the DVD+RW/+R as a video title (movie). It will appear in the index picture overview as a separate title.

This video will be recorded automatically after the last recording. No existing titles will be overwritten.
Ensure that there is enough space on the disc.

❻ To end, press **DISC-MENU** .

Making a slide show from an album

❼ Select the disc (top symbol) in the '***Media menu***' and confirm with ▶ .

❽ Add pictures to the album as described in chapter 'Adding pictures to the album'.

❾ You can change the order of the pictures, erase unwanted pictures, enter a new name for an album, or change the cover picture of the album, until the album corresponds to your personal preferences.

❿ Select '***Make video title***' in the menu '***Album Settings***' using ▼ , ▲ .

⓫ Confirm with **OK** . 'SAVING' will appear in the display and the screen will show the time left until completion.
The new album will be stored on the DVD+RW as a video title (movie). It will appear in the index picture overview as a separate title.

This video will be recorded automatically after the last recording. No existing titles will be overwritten.
Ensure that there is enough space on the disc.

⓬ To end, press **DISC-MENU** .

Changing the media settings

You can adjust various settings for a DVD+RW/+R or a memory card. If a CD-R/RW is loaded no changes can be made, because this media cannot be recorded by the DVD recorder

❶ Press **PHOTO** on the remote control. The '***Media menu***' screen will appear.

❷❸ Use ▼ or ▲ to select the medium you want to process (disc or memory card). If you did not insert the corresponding medium (disc or memory card), a warning sign will appear above the symbol on the left hand side of the screen.

❹ Press ▶ .

❺ Select the line '***Media settings***' and confirm with **OK** .

'*Media name*'

The name of the media will be created by the digital camera.

'*Protection*'

The write protection of the media can be switched on or off.
You can use this function only if the write protection can be switched off by a software. You can not select this line if your memory card was equipped with a mechanically switch.

'*Prepare media*'

The DVD+RW/+R will be prepared for the data transfer. Read further information in the section 'Preparing a DVD+RW/+R'.

'*Finalise disc*'

You can select this line only if a 'not finalised' DVD+R is loaded.
If you store pictures on a DVD+R, you have to finalise the disc to play it on a DVD-player. Once this process is complete, no further changes can be made.

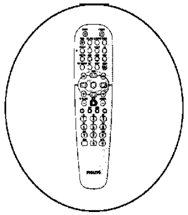
'*Erase media*'

With these setting all data (rolls and albums) can be erased on a recordable media (DVD+RW or memory card). This procedure cannot be reversed

Problem solving for 'Digital Photo Manager'

PROBLEM	SOLUTION
Messages instead of the thumbnails:	✓'***Thumbnail not available***' The photo does not have a associated thumbnail. In this case, the photo but not the thumbnail is viewable. ✓'***Too large to display***' The image is too large to be viewed in its thumbnail format. ✓'***Hidden photo***' The corresponding (hidden) photo will not be shown during the slide show. You can unhide this photo in the album overview again. ✓'***Photo not found***' In the album overview a photo entry is found that no longer exists on the referenced source media.
Error message '*Media does not contain photos*':	✓On the inserted media (disc or memory card) no photo can be found. ✓The file extension has to be *.JPG and not *.JPEG. ✓The storage media should contain a sub directory 'DCIM'. Under that there should be folders so called '***Rolls***'. Only pictures in these folders can be recognised ✓Pictures can also be stored in the root directory. ✓ Before you make changes to the storage media check the content of the media in a computer or in a digital camera.
My computer can not read the DVD+RW/+R:	✓Check that your DVD drive on the computer can read DVD+RW/+R discs. ✓Check that your operating system of your computer support the file system UDF (Universal Disc Format). Install if necessary the required driver. From the DVD-Recorder the DVD+RW/+Rs were recorded in the format UDF 1.02 ('***Video & photo***') and UDF 1.50('***Photo only***').
The DVD-Recorder can not read the disc (CD-ROM, DVD), no pictures available:	✓The file extension has to be *.JPG and not *.JPEG. ✓ The disc should contain a sub directory 'DCIM'. Under that there should be folders so called '***Rolls***'. Only pictures in these folders can be recognised. ✓Pictures can also be stored in the root directory. ✓If you create a CD-ROM, you have to store the photos in the same directory structure as on a DVD+RW/+R If you use a CD-ROM from a photo shop or something similar, the whole disc will be searched for the photos on the basis of the disc format.
The memory card can not be read by the DVD-Recorder, no pictures available:	✓The memory card should contain a sub directory 'DCIM'. Under that there should be folders so called '***Rolls***'. Only pictures in these folders can be recognised. ✓Pictures can also be stored in the root directory. ✓The file extension has to be *.JPG and not *.JPEG.

10 Manual recording



General

Which discs can I use for recording?

With this DVD recorder, you can record on two types of DVD:

DVD+RW

This disc can be written to and then the contents deleted.

DVD+R

This type of disc can only be recorded once.

If you want to play this DVD in a DVD player it must be finalized using the '*Finalise disc*' function. It is not possible to make further recordings using this disc.

If this disc is to be played in a DVD recorder it must not be finalised.

Recordings can be added and deleted. The disc space (playback time) from the deleted recording cannot be recovered for further recordings

?

Use the 'Manual recording' function to spontaneously start recording (e.g. to record a TV show already in progress).

In the 'index display' select the title to be overwritten or '*Empty title*' with ▼ , ▲ .

If you insert recordings between existing recordings, check the lengths of the old and new recordings. If the new recording is too long the subsequent recording (title/chapter) will be overwritten.

Insert new recordings at the end of all existing recordings (Safe Record)

To add a new recording at the end of the last recording on the disc, hold down the **REC/OTR ●** button until the message 'SAFE REC' appears on the display.

For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.

End of disc is reached

If the end of a disc is reached during recording, recording will stop and the Recorder will turn itself off automatically.

Tip

Please refer to section **'Recording without automatic switch-off'**, if you want to manually start and stop your own recording.

If you want to start a recording manually but have it stopped automatically, read the section **'Recording with automatic switch-off'**. (e.g. not to record to the end of the disc)

Read the section **'Automatic recording from a satellite receiver'**, if you want a recording to be controlled automatically by a satellite receiver.

Read the section **'Direct record'** if you want to record a programme currently being shown.

Recording without automatic switch-off

ENGLISH

❶ Switch on the TV set and select the programme number for the DVD recorder.

❷ Insert a disc on which the recording is to be made. This disc is then checked for content and system. READING' will appear on the display.

× **Index display**

✓ A DVD+RW disc has been inserted that already contains recordings. Use the ▲ or ▼ button to select the point where the recording is to start.

× **The message 'EMPTYDISC' appears in the display**

✓ The disc inserted is a blank DVD disc.

× **A dialog box appears asking you whether you want to delete the contents or eject the disc**

✓ The disc inserted is a DVD+RW but its contents are not DVD video-compatible (e.g. a data disc). Recordings on this disc can only be made if the entire disc is first deleted with the **REC/OTR ●** button.

× **The message '*Title limit*' appears on the screen if a recording is to be made**

✓ A disc may contain a maximum of 48 titles (including blank titles). Delete titles or change the disc.

Problem

❸ If necessary, use the **MONITOR** button on the remote control to switch to the internal tuner in the DVD recorder.

❹ Use **CHANNEL +** or **CHANNEL −** to select the programme number (station name) you want to record. This will appear on the display:

Programme numbers of the external inputs:

'EXT1' Scart socket at the back **EXT 1 TO TV-I/O**

'EXT2' Scart socket at the back **EXT 2 AUX-I/O**

'CAM1' Front SVHS/audio sockets **S-VIDEO / left AUDIO right**

'CAM1' Front video/audio sockets A/V **S-VIDEO / left AUDIO right**

Switching between the **S-VIDEO** and **VIDEO** sockets takes place automatically. If a signal is available at both sockets at the same time, the signal at the **S-VIDEO** socket has priority.

'CAM2' Digital Video (i Link) front socket **DV IN**

Tip

❺ To start recording, press **REC/OTR ●** on the remote control or **RECORD** on the DVD recorder.

If you want to start the recording at the end of the existing recordings, hold down the **REC/OTR ●** button until the message 'SAFE REC' appears on the display.

For DVD+R discs each new recording is always added at the end of all previous recordings as existing recordings cannot be overwritten.

This will, for example, appear in the display:

Insert chapter markers

During recording you can mark scenes so you can find them or hide them later.

During recording, press **EDIT** at the start point. '***Inserting marker***' appears on the TV screen. In the display, the number of the 'CHAPTER' increases by one.

For further information on titles and chapters, see the section on 'Changing to another title/chapter' in 'Playback'.

6. Use the **STOP ■** button on the remote control or ■ on the machine to stop the recording. 'MENU UPDT' will appear on the display. The DVD recorder is writing the list of contents. Wait until the message disappears from the display. The recording is then complete.

× **The display will read 'DISC ERR'**

✓ Recording could not be completed correctly because of a disc error. Check the disc and clean it if necessary.

Making recordings on DVD+R discs compatible

If you want to play back the recording on a DVD player, you need to finalise the disc in the DVD recorder. You can prepare your DVD for use in a DVD player using the '***Finalising***' feature. See 'Finalising DVD+R discs' in 'Managing the disc contents'.

Interrupt recording (Pause)

1. During recording press **PAUSE II** , for example to avoid recording the commercials.
2. To continue recording, press **REC/OTR ●** .

End recording

To end the recording, press the **STOP ■** button. Wait until 'MENU UPDT' disappears from the display.

Recording with automatic switch-off (OTR one-touch-recording)

1. Insert a disc.
2. If necessary, use the **MONITOR** button on the remote control to switch to the internal tuner in the DVD recorder.
3. Use **CHANNEL +** or **CHANNEL −** to select the programme number (channel name) you want to record.
4. Press **REC/OTR ●** on the remote control.
5. Each time you press **REC/OTR ●** you will add 30 minutes to the recording time.

How can I cancel the recording time I have just entered?

To delete an entry, press **CLEAR** while the display shows the recording time.

How can I check the remaining recording time?

Press **SYSTEM-MENU** while an OTR is in progress. The time at which the recording will end will appear on the TV screen in the timer info box.

Preventing accidental erasing of discs

To ensure you don't accidentally delete a recording you can protect the entire disc. You can only ever protect the entire disc. You cannot protect individual recordings.

What happens with DVD+R discs?

As long as these discs are not finalised, they can be protected against accidental erasure in the same way as DVD+RW discs.

1. Insert the disc to be protected.
2. While the index screen is displayed press **STOP ■** on the remote control. The first title is highlighted.
3. Press ▲ . This takes you to the disc info screen.
4. Press the ▶ button.
   Select the '***Protection***' line.
   Confirm with ▶ .

❺ Select '***Protected***' with the ▼ button and confirm with **OK** .

❻ Press ◀ and then **DISC-MENU** to terminate.

The entire disc is now protected.
If an attempt is made to record on a protected disc, 'DISC LOCK' will appear on the display and '***Disc locked***' will appear on the screen.

If you later decide to record on the disc, follow these steps but select '***Unprotected***' at step ❺ .

Tip

Lining up recordings within a title (assemble cut)

On a recorded DVD+RW disc you can add another recording to an existing title. This recording is added to the title as a 'chapter'. The existing information will be overwritten starting from this point. Titles will also be overwritten that follow the current title depending on the length of the new recording. The recording type (Quality) will be taken from the current title.
To play back this recording, press **SYSTEM-MENU** and use the ▶ button to select the 'C' (Chapter) symbol. You can also use the **T/C** key.

For further information, see 'Changing to another title/chapter' in 'Playback'.

What happens with DVD+R discs?
New recordings on 'DVD+R' discs can only be added after existing recordings.
It is not possible to overwrite existing recordings on 'DVD+R' discs.

?

❶ In the index display, find the title to which the new recording is to be added.

❷ Look at the last minute of the old recording (playback)

❸ Press **PAUSE II** on the remote control at the position where the new recording is to go. '**II** ' will appear on the screen.

❹ To monitor the recording you can press **MONITOR** to switch to the internal tuner.

❺ Now start recording as usual by pressing **REC/OTR ●** on the remote control.
The new recording will be inserted.

❻ Stop recording with **STOP ■** .

Selecting the recording type (picture quality)

You can select the picture quality of the recording using the recording quality feature and hence the maximum recording time per disc.
To check the quality of a recording mode you can make a 'test recording' with the desired recording mode. Check during playback the quality of this 'test recording'.
During playback, the correct picture quality will automatically be selected.

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

Select the record mode with the button **REC MODE** on the remote control.

Which recording types can I choose?
Please observe, that you can not switch the recording type during recording. You have to interrupt the recording with the STOP ■ button.

'***M1***': High Quality offers the best picture quality and a recording time of 1 hour.

'***M2***': Standard Play (pre-recorded DVD quality) offers standard picture quality and a recording time of 2 hours.

'***M2x***': Standard Play plus (better than S-VHS quality) offers standard picture quality and a recording time of 2.5 hours.

'***M3***': Long Play (S-VHS picture quality). Recording time of 3 hours.

'***M4***': Extended Play (better than VHS picture quality). Recording time of 4 hours.

'***M6***': Super Long Play (VHS picture quality). Recording time of 6 hours.

'***M8***': Super Extended Play (VHS picture quality). Recording time of 8 hours.

Can I select the recording type via a menu as well?

❶ Press the **SYSTEM-MENU** button.
❷ Select '⚒' symbol with ◀ or ▶ .
❸ Select '***Record settings***' using ▼ or ▲ and confirm with ▶ .
❹ In the line '***Record mode***' select the recording type with ◀ or ▶ .
❺ Confirm using **OK** and **SYSTEM-MENU** .
❻ If you have selected the recording mode '***M3***', '***M4***', '***M6***' or '***M8***', you can select the '***Stndrd***' (Standard) or '***Sport***' setting (for rapid movements) in the '***Filter mode***' line.

Tip

Automatic recording from a satellite receiver (Sat recording)

You can use this function if your own a satellite receiver that can control other devices via a scart cable and a programming function (timer). For more information, please see the operating instructions for the satellite receiver.

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❸ Select '⅂⅄' symbol with ◀ or ▶ .

❹ Select '***Record settings***' using ▼ or ▲ and confirm with ▶ .

❺ Select '***Sat record***' using ▼ or ▲ .

❻ Select '***EXT2***' with ◀ or ▶ .

Switching off 'Sat Recording'
To switch off the function, select '***Off***' using ▶ or ◀ .
Tip

❼ Confirm with **OK** .

❽ Use a scart cable to connect scart socket **EXT 2 AUX-I/O** on the DVD recorder to the corresponding scart socket on the satellite receiver.

❾ To end, press **SYSTEM-MENU** .

❿ Insert a disc you want to use for recording.

⓫ Programme the satellite receiver with the required information (programme number of the TV channel, start time, finish time).
If necessary, please see the operating instructions for your satellite receiver.

⓬ Switch off the DVD recorder using **STANDBY** ⏻ . 'SAT' also appears in the display to indicate that the function is active.

The DVD recorder is now ready to record. The start and end of the recording is controlled via scart cable **EXT 2 AUX-I/O** .

Direct Record

Can you record the right TV channel in seconds when the DVD recorder is switched off? No problem. If recording is started manually, the **switched-off** DVD recorder takes the current TV channel from the TV set via the scart cable.
You will find more information on how to switch 'Direct record' on or off in the next section 'Direct record'.

How does Direct Record work?
The DVD recorder compares the TV channel selected on the TV set with its stored TV channels via the scart cable. If the same TV channel is found, it switches the DVD recorder to the corresponding programme number and starts recording.

Please do not change channel on the TV during the search. This could affect the tuning of the DVD recorder.

❶ On the TV set, select the programme number you want make the recording from.

❷ Press **REC/OTR ●** with the DVD recorder **switched off**.

× **The display will read 'WAIT'**
✓ The DVD recorder is comparing its saved TV channels with those of the TV set. Please do not change the TV channel on the TV set while 'WAIT' is shown in the display.

× **'NOTV' appears in the display**
✓ This TV channel could not be found in the DVD recorder's memory.
Check that all TV channels saved on the TV set are available on the DVD recorder. If required, save any missing channels. Please read 'Manual TV channel search' in 'Installing your DVD recorder'.
✓ Check the connectors at both ends of the scart cable.
✓ Check your TV's operating instructions to see which scart socket is used for video signals.
✓ If the problem persists, you won't be able to use this feature.

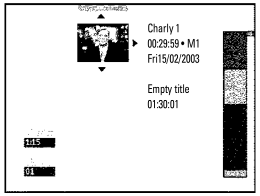
Problem

❸ Stop recording with **STOP ■** .

Switching 'Direct Record' on or off

1. Switch on the TV set. If required, select the programme number for the DVD recorder.
2. Press **SYSTEM-MENU** on the remote control. The menu bar appears.
3. Select 'Ⴗ⅄' symbol with ◀ or ▶ .
4. Select '***Record settings***' using ▼ or ▲ and confirm with ▶ .
5. Select '***Direct Record***' using ▼ or ▲ .
6. Select '***On***' (Direct Record on) or '***Off***' (Direct Record off) using ◀ or ▶ .
7. Confirm with **OK** .
8. To end, press **SYSTEM-MENU** .
9. Switch off with **STANDBY** ⏻ .

11 Managing the disc contents



General

When a recording is made to disc, the following additional information is also stored at the beginning of the recording:
•) Name of the recording
If the TV station does not transmit a name, only the
channel number and time will be stored as the name
•) Length of the recording
•) Record type (Quality)
•) Date of the recording
•) Index picture of the recording

A marker will be set every 5-6 minutes if the '***Auto chapters***' function is activated in the '***Record settings***' menu. This marker is known as a 'chapter'.
These markers can be changed when the recording has finished.

Can markers be set on a DVD+R disc?
Markers can be set on these discs if they have not been finalised.
?

It is also possible to add 'chapters' later. This means that scenes you do not want to see during playback, such as commercials, can be hidden or skipped. During playback you can watch your recording as a continuous sequence without the hidden chapters.

Select from the following chapters:

'Favorite Scene Selection',
to divide the title into chapters or to manage the chapters.

'Editing recording titles (name)',
to change the recording names.

'Play complete title',
to play the entire title including the hidden chapters.

'Delete recording/title'to delete the relevant title and therefore also the recording.

'Disc settings'to change the general settings of the disc.

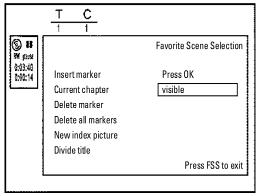
Favorite Scene Selection

In this menu you can adapt a title to suit your particular needs.
You can insert/delete chapter markers, hide chapters, select a new index, or split up a title.
Press **EDIT** on the remote control during recording to open this menu.

Insert chapter markers

During recording, you can set or delete chapter markers within a title.
The maximum number of chapters per disc is 124 and 99 per title. If one of these limits is reached the following message will appear on the screen: '***Chapter limit***'. You need to delete some markers before you can insert new ones or make recordings.

❶ During playback, press **EDIT** on the remote control at the appropriate point. The '***Favorite Scene Selection***' menu appears on the TV screen.



❷ Confirm '***Insert marker***' by pressing **OK**. '***Inserting marker***' appears on the TV screen.

Tip

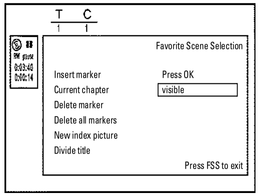
'X' will appear on the screen:
This DVD is write-protected or the disc is a finalised DVD-R. Subsequent changes cannot be made.

❸ To stop this function, press **EDIT**.

Hiding chapters

Initially, all the chapters are visible. You can hide chapters for playback (e.g. advertisements) or make them visible again. In editing mode, hidden chapters are shown darker.
A chapter always consists of a start marker and an end market.
To hide a certain scene, proceed as follows:

❶ Search the beginning of the scene you want to hide. Press **PAUSE II**.



❷ Press **EDIT** on the remote control to call the '***Favorite Scene Selection***' editing menu.

❸ Set the start marker using **OK**.
The number of chapters ('C') in the menu line will increase by one.

❹ Search for the end of the scene. You can also use **▶▶I** or **I◀◀** to search faster for the end of the scene.
Make sure that you do not jump into the next title (title number 'T' must not change). Only chapters within a title can be hidden.

❺ Press **PAUSE II** at the corresponding position.

❻ Set the end marker with **OK**. This will also be the start marker of the next chapter.
The number of chapters ('C') in the menu line increases by one.

Problem

× **The number of chapters ('C') has increased by two or more numbers**
✓ This is the case when you want to hide a chapter that, due to automatic chapter numbering (if switched on), stretches over two or more chapters.
In this case, you must delete the start of the automatically generated chapter:
❶ Press **T/C** twice while the editing menu is displayed to change the chapter number.
❷ Select the chapter between the new markers using **▼** or **▲**. Press **PAUSE II**.
❸ Select '***Delete marker***' with **▼** to delete the current chapter marker. Confirm with **OK**. The current chapter number decreases by one.

❼ Press **T/C** twice to change the chapter number 'C'.

❽ Select the previous chapter with **▼**, since you are already in the next chapter (end of the chapter is also the beginning of the next chapter).

❾ Wait until the chapter has been played and press **PAUSE II** to stop playback.

❿ Select '***Current chapter***' using **▼** or **▲**.

⓫ Using **▶** select '***hidden***'. The picture is shown darker.

Tip

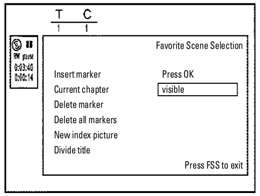
Switching quickly
You can switch between show chapters ('***visible***') and hide chapters ('***hidden***') quickly and easily using **SELECT**.
This function is independent from the selected line.

⓬ To end, press **EDIT**.

During playback this chapter will be skipped.
If the chapter is not visible, select '***visible***' in step ❸ with **▶**.

Deleting chapter markers

Within a title you can delete either all markers or individual markers.



❶ While the relevant chapter is playing, press **EDIT** on the remote control. The '***Favorite Scene Selection***' menu appears on the TV screen.

How can I select different chapters?

❶ Press the **T/C** button on the remote control. Titles and chapters are displayed at the top of the screen.
❷ Select title (T) or chapter (C) with ▶ or ◀.
❸ Use ▲ or ▼ to select the title/chapter channel you want to edit.

Tip

❷ Use ▼ to select either '***Delete marker***' for this chapter or '***Delete all markers***' for all chapters within the selected title.

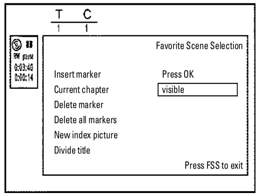
❸ Confirm with **OK**. (You will be prompted to press **OK** again to make sure you really want to delete all markers. If you do not want to, press the ◀ button.)

❹ To end, press **EDIT**.

Changing the index picture

Normally the picture from the begin of a recording is used as the index picture. You can however choose any picture from the recording as the index picture.

❶ During playback, search for location of the new index picture. Press the **PAUSE II** button.



❷ Press the **EDIT** button. The '***Favorite Scene Selection***' menu appears on the TV screen.

❸ Select line '***New index picture***' and confirm with **OK**.

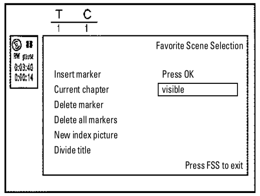
❹ Start the change with **OK**. '***Updating menu***' appears on the TV screen.

Once the revision has been completed successfully the DVD recorder reverts to the index overview.

Changing the menu background

You can choose any frame from the recording as the menu background. This setting is stored on the inserted DVD. Please note that after the modification the 'original background' will be lost. If you erase the complete disc (close the disc tray with **CLEAR** and make a recording) the 'original background' will be restored.

❶ During playback, search for the location that is to be used as the new menu background. Press the **PAUSE II** button.



❷ Press the **EDIT** button. The '***Favorite Scene Selection***' menu appears on the TV screen.

❸ Select line '***New background***' and confirm with **OK**.

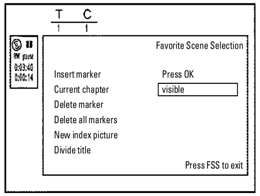
❹ Start the change with **OK**. '***Updating menu***' appears on the TV screen.

Once the revision has been completed successfully the DVD recorder reverts to the index overview.

Dividing titles

You can divide a title into several sections (titles) of any size. Each of these sections (titles) is identified by its own index.
Note: This division cannot be undone.

Can I divide titles on DVD+R discs?
As recordings on DVD+R discs cannot be overwritten, it is not possible to divide titles on DVD+R discs.
?



❶ While the relevant title is playing, press **EDIT** on the remote control. The '***Favorite Scene Selection***' menu appears on the TV screen.

❷ Select '***Divide title***' and confirm with the **OK** button.

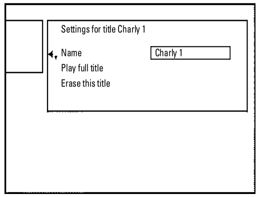
❸ If you are sure, press **OK** to start the process. '***Dividing title***' appears on the TV screen.

❹ Wait until the new title is displayed with an index picture in the index picture overview.

The process of splitting the title is now complete.

Editing recording titles (name)

Some TV stations transmit the title (name) of a programme. In this case, the name will be included automatically (e.g. 'ROCKY'). Otherwise, the only the programme number (programme name) and the time are stored as the name of the recording. The name of the recording can only be changed after the recording has been completed.



Settings for title Charly 1

Name Charly 1

Play full title

Erase this title

❶ If required, press the **STOP ■** button to interrupt playback.

❷ Using ▲ or ▼ select the title whose name you want to edit and confirm with ▶ . The menu for editing names appears.

❸ Select '***Name***' using ▲ or ▼ and confirm with ▶ .

❹ Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.

❺ Change the icon using ▲ or ▼ . You can switch between upper and lowercase using **SELECT** . You can delete the character using **CLEAR** .

How can I enter the characters with the buttons 0..9/abc ?

Press a number button as often as the required character or the number appears. You can enter language dependent characters with the buttons ⏮ or ⏭ on the corresponding character e.g.: ä, button **2** for 'a' and then with ⏭ as often as 'ä' appears.
For special characters press **1** more the once .
The position for the following character will be selected automatically.
To enter a space press the **1** button.
To swith over to upper case characters press **SELECT** .
To erase a character press **CLEAR** .

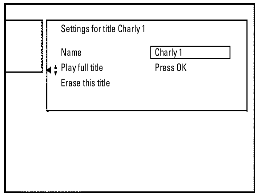
❻ Repeat ❹ and ❺ until you have made the changes you want.

❼ Save the new name with **OK** . '***Storing name***' appears on the TV screen for confirmation.

❽ To end, press ◀ .

Playing the entire title

If you have hidden certain sections (chapters) of a title, this setting lets you watch the entire title including the hidden sections. To do this, proceed as follows:



Settings for title Charly 1

Name Charly 1

Play full title Press OK

Erase this title

❶ Press the **STOP ■** button or during playback press **DISC-MENU** .

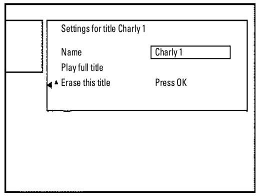
❷ Using ▲ or ▼ select the title you want to play all of and confirm with ▶ . The title editing menu will appear.

❸ Select '***Play full title***' using ▲ or ▼ and confirm with **OK** .

❹ Playback starts automatically. The title is played in its entirety - including the hidden chapters.

Erasing recordings/titles

You can erase specific recordings from a disc. To do this, proceed as follows:



Settings for title Charly 1

Name Charly 1

Play full title

Erase this title Press OK

❶ Press the **STOP ■** button or during playback press **DISC-MENU** .

❷ Using ▲ or ▼ select the title you want to delete and confirm with ▶ . The title editing menu will appear.

❸ Select '***Erase this title***' using ▲ or ▼ and confirm with **OK** . '***This will completely erase this title***' appears on the TV screen. '***Press OK to confirm***'.

❹ If you want to delete this title, press **OK** to confirm. Otherwise press ◀ .

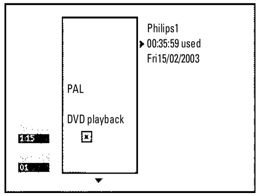
❺ '***Erasing title***' appears on the TV screen.

❻ At this point '***Empty title***' appears in the 'index picture display'. A new recording can now be made here.
If the deleted title was very short (less than 1 minute) '***Empty title***' will not appear at this point.

Can titles be deleted from a DVD+R disc?

Titles on DVD+R discs are only marked as deleted. '***Deleted title***' will appear in the display instead of '***Empty title***'. During playback the 'deleted' title is skipped. The space used for this title cannot be used again as the title has not been physically deleted. Once the disc has been finalised no further changes can be made.

Disc settings



This screen appears **before** the first title and contains general information about the current disc.

You can:
•) change the name of the disc
•) activate or deactivate write protection on the disc
•) Finish editing (make the disc DVD compatible)
•) finalise a DVD+R
•) delete a DVD+RW

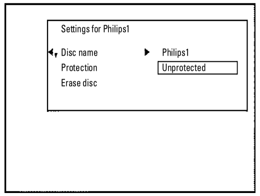
To get to this display, proceed as follows:

❶ Press the **STOP ■** button or during playback press **DISC-MENU**.

❷ Select the first title with ▲ or press **STOP ■**.

❸ Press the ▲ button. The disc info display will appear.

Changing the disc name


Settings for Philips1
Disc name ▶ Philips1
Protection Unprotected
Erase disc

❶ In the 'Disc info display' press ▶. The '***Settings for***' menu appears on the TV screen.

❷ Select '***Disc name***' using ▲ or ▼ and confirm with ▶.

❸ Using ▶ or ◀ select the position where the letter/number/icon is to be changed/re-entered.

❹ Change the icon using ▲ or ▼. You can switch between upper and lowercase using **SELECT**. You can delete the character using **CLEAR**.

❺ Repeat ❸ and ❹ until you have made the changes you want.

❻ Save the new title with **OK**. '***Storing name***' appears on the TV screen for confirmation.

❼ To end, press ◀.

Finishing editing

If one or more titles have been edited a DVD player may still display the original titles. You can prepare your DVD+RW disc in such a way that a DVD player will be able to play the edited version.

❶ In the 'Disc info display' press ▶. The '***Settings for***' menu appears on the TV screen.

❷ Select '***Make edits compatible***' using ▲ or ▼ and confirm with **OK**.

Problem

×'***Make edits compatible***' **does not appear**
✓ Your disc is already compatible. There is no need for conversion. To end, press **SYSTEM-MENU**.

❸ The screen displays '***This will take***' to show how long the process will last.

❹ To confirm press **OK**. '***Working***' appears on the TV screen. A bar will move from left to right indicating progress.

Finalising DVD+R discs

This feature is required to play back a DVD+R disc in a DVD player. Once the disc has been finalised no further recordings or changes can be made.

❶ In the 'Disc info display' press ▶. The '***Settings for***' menu appears on the TV screen.

❷ Select '***Finalise disc***' using ▲ or ▼ and confirm with **OK**.

Problem

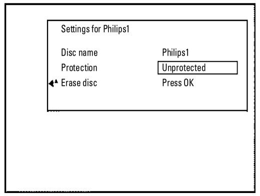
×'***Finalise disc***' **does not appear**
✓ Either there is no DVD+R disc inserted or the disc is already finalised. To end, press **SYSTEM-MENU**.

×**The '*Settings for*' menu does not appear**
✓ The menu may not appear if the disc has been recorded on another DVD recorder. In this case, use the '***Finalise disc***' feature in the '⚒' menu, under '***Features***'.

❸ The screen displays '***This will take...***' to show how long the process will take.

❹ To confirm press **OK**. '***Working***' appears on the TV screen. A bar will move from left to right indicating progress.

Erase DVD+RW disks



Settings for Philips1

Disc name Philips1

Protection Unprotected

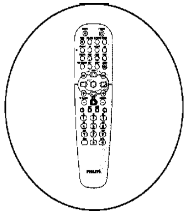
Erase disc Press OK

1. In the 'Disc info display' press ▶ . The '***Settings for***' menu appears on the TV screen.
2. Select '***Erase disc***' using ▲ or ▼ and confirm with **OK** . '***This will erase all titles***' appears on the TV screen. ***Press OK to confirm***'.
3. If you want to delete all the titles, press **OK** to confirm. Otherwise press ◀ .
4. '***Erasing disc***' appears on the TV screen.
5. After deletion, the index picture display shows the free space on the disc.

Tip

If the disc is empty already, you cannot select '***Erase disc***'.

12 Programming a recording (TIMER)



General

Use 'Programming a recording (TIMER)', to automatically start and stop a recording at a later date.

The DVD recorder will switch to the right programme number and begin recording at the correct time.
With this DVD recorder, you can pre-programme up to six recordings within a period of one month.

To make a programmed recording, your DVD recorder needs to know:
* the date you want to make the recording
* the programme number of the TV channel
* the start and stop time of the recording
* VPS or PDC on or off
* the recording mode (picture quality) ('***M1/M2/M2x/M3/M4/M6/M8***')

Tip

Fit to space Recording

You can select also the recording mode '***FR***' .
With these setting the recording mode (bit rate) will be automatically calculated to use the complete empty space (title '***Empty***').
If the empty space is too small the recording will be stopped to prevent the following titles from being overwritten.

This information is saved in a 'TIMER block'.
Before you begin, make sure the clock is set. If the clock is not set, the '***Time/Date***' menu will appear when you press the **TIMER** ⏲ button.

What is 'VPS/PDC'?

'VPS' (Video Programming System)/'PDC' (Programme Delivery Control) are used to control the start and duration of TV channel recordings. If a TV programme starts earlier or ends later than was scheduled, the DVD recorder will then turn on and off at the correct time.

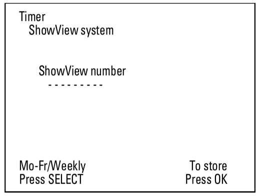
What do I need to know about 'VPS/PDC'?

- Usually the start time is the **same** as the VPS or PDC time. If a different 'VPS/PDC time' is indicated, e.g.: '20.15 (VPS/PDC 20.14)', the **VPS/PDC time** '20.14' must be entered **exactly to the minute** during programming.
  If you want to programme a time that is different from the VPS or PDC time, you must switch off VPS or PDC.
- Only one TV program of a TV channel can be controlled using 'VPS/PDC' at a time. If you want to record two or more TV programmes on a TV channel using 'VPS/PDC', you will need to programme these as two separate recordings.
- Since the DVD recorder requires a certain lead time (for getting the disc up to speed and positioning the laser) before recording can start, it is possible that the recorder will miss the first few seconds of a TV show recorded with VPS/PDC.
  In this case, disable VPS/PDC and enter a start time one minute earlier.

Programming recordings with the ShowView® System

SHOWVIEW®

Thanks to this programming system, you no longer need to tediously enter the date, programme number, start and finish times. All the information needed by the DVD recorder for programming is contained in the ShowView® programming number. This 9-digit ShowView® number is found in most TV listings magazine.



Timer
ShowView system

ShowView number
- - - - - - - - -

Mo-Fr/Weekly Press SELECT
To store Press OK

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Press **TIMER** ⏲ on the remote control.
The programming method selected last is marked.

❸ Select '***ShowView system***' using ▼ or ▲ and confirm with ▶ .

❹ Enter the entire ShowView number. This number is up to 9 digits long and can be found next to the start time of the TV programme in your TV listings magazine.
e.g.: 5-312-4 or 5,312 4
Enter 53124 for the ShowView-number.
If you make a mistake, you can clear your instructions with **CLEAR** .

Selecting daily/weekly recordings
Using **SELECT** , select from the following options:
'***Mo-Fr***': Repeated daily recordings (Monday to Friday).
'***Weekly***': Repeated weekly recordings (every week on the same day).

Tip

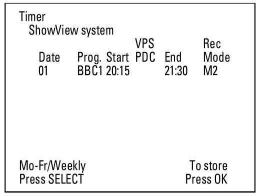
❺ Confirm with **OK** .

×**The following message appears on the screen: '*Please enter programme number*'**
✓ The programme number of the TV channel has not yet been assigned to the ShowView number. Use ▶ , ◀ or the number buttons **0..9/abc** on the remote control to select the appropriate programme number (name) of the TV channel and confirm with **OK** .

×**The following message appears on the screen: '*ShowView number wrong*'**
✓ The entered ShowView number is incorrect. Correct your entry or cancel using the **SYSTEM-MENU** button.
✓ Check the time/date (see 'Setting the time & date' in 'Installing your DVD recorder').

×**The following message appears on the screen: '*Weekend programming not possible*'**
✓ A daily recording was entered for the wrong day. Daily programming can only be used for recordings to be made from Monday to Friday.

Problem



Timer
ShowView system

Date	Prog.	Start	VPS PDC	End	Rec Mode
01	BBC1	20:15		21:30	M2

Mo-Fr/Weekly Press SELECT
To store Press OK

❻ The decoded data appears after confirmation. You can go back and change the data. Select the appropriate input field with ▶ or ◀ . If required, make changes using ▲ , ▼ or the number buttons **0..9/abc** .

'Switching on 'VPS/PDC' in the '*Start*' input field
Select the '***Start***' input field using ▶ . Using **SELECT** switch on 'VPS/PDC' ('*' lights up). If you press **SELECT** again, you will switch 'VPS/PDC' off ('*' goes out).

Changing the recording mode in input field '*End*'
Select the '***End***' input field using ▶ .
Use **REC MODE** to select the recording mode '***M1***, ***M2***, ***M2x***, ***M3***, ***M4***, ***M6***, ***M8***'.

Fit to space Recording
You can select also the recording mode '***FR***' .
With these setting the recording mode (bit rate) will be automatically calculated to use the complete empty space (title '***Empty***').
If the empty space is too small the recording will be stopped to prevent the following titles from being overwritten.
Do not use this function under the following conditions:
•) more then one programmed recording
•) daily/weekly repeated recordings
•) recordings with VPS/PDC
May be the calculation of the recording mode can not function properly.

Tip

❼ If all information is correct, press the **OK** button. The programming information is stored in a TIMER block.

❽ To end, press **TIMER** ⏲ .

❾ Insert a recordable disc (one without write protection).
The inserted disk is checked.

❿ Search the position on the disc where the recording should begin. Press **STOP** ■ .

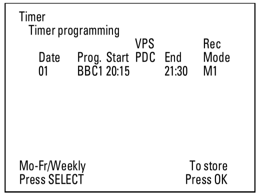
⓫ Switch the DVD recorder off with **STANDBY** ⏻ .
The programmed recording will only function properly if the DVD recorder has been **switched off** using the **STANDBY** ⏻ button.

If any of the TIMER blocks are in use, '***TIMER***' will light up on the recorder display.

Programming recordings without the ShowView® System

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Press **TIMER** ⏲ on the remote control.
The programming method selected last is marked.



```
Timer
  Timer programming
                              VPS          Rec
     Date     Prog.  Start  PDC   End    Mode
     01        BBC1 20:15           21:30  M1



Mo-Fr/Weekly                              To store
Press SELECT                              Press OK
```

❸ Select line '***Timer programming***' with ▼ or ▲ . and confirm with the ▶ button.
The information will appear on the screen.

❹ Select the input field with ◀ or ▶ .

❺ Enter information with ▼ or ▲ or with the number buttons **0..9/abc** .

<u>Selecting daily/weekly recordings</u>

In '***Date***' use **SELECT** to select from the following options:
'***Mo-Fr***': Repeated daily recordings from Monday to Friday
'***Mon***': Repeated weekly recordings (every week on the same day, e.g. Monday).

<u>Programme numbers of the '*EXT1*' and '*EXT2*'scart socket</u>

You can also programme recordings from external sources via scart socket **EXT 1 TO TV-I/O** ('***EXT1***') or **EXT 2 AUX-I/O** ('***EXT2***').

<u>'Switching on 'VPS/PDC' in the '*Start*' input field</u>

Select the '***Start***' input field using **TIMER** ⏲ . Using **SELECT** switch on 'VPS/PDC' ('*' lights up). If you press **SELECT** again, you will switch 'VPS/PDC' off ('*' goes out).

<u>Changing the recording quality in input field '*End*'</u>

Select the '***End***' input field using ▶ .
Use **SELECT** to select the recording mode.

Tip

❻ If all information is correct, press the **OK** button. The programming information is stored in a TIMER block.

❼ To end, press **TIMER** ⏲ .

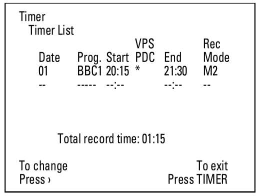
The disk you have inserted will be checked.

❽ Search the position on the disc where the recording should begin.

❾ Switch off with **STANDBY** ⏻ .
The programmed recording will only function properly if the DVD recorder has been **switched off** using the **STANDBY** ⏻ button.

If any of the TIMER blocks are in use, '***TIMER***' will light up on the recorder display.

How to change or delete a programmed recording (TIMER)



```
Timer
  Timer List
                        VPS          Rec
    Date   Prog. Start  PDC   End    Mode
    01     BBC1  20:15  *     21:30  M2
    --     ----- --:--        --:--  --

          Total record time: 01:15

To change                        To exit
Press ›                       Press TIMER
```

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Press **TIMER** ⏲ on the remote control.
The programming mode selected last is marked.

❸ Select '*Timer List*' using ▼ or ▲ and confirm with ▶ .

❹ Select the programmed recording (TIMER) you want to check, change or delete with ▼ or ▲ .

Delete programmed recording

❶ Press the **CLEAR** button.

❷ Confirm with **OK** . '*Timer Cleared*' will briefly appear on the TV screen.
'-- ---' appears rather than the displayed values

❸ To end, press **TIMER** ⏲ .

Tip

❺ Press ▶ .
Select the input field with ◀ or ▶ .
If required, change the information with ▲ , ▼ or the number buttons **0..9/abc** .

❻ Confirm with **OK** .

❼ To end, press **TIMER** ⏲ .

❽ Switch off with **STANDBY** ⏻ .

'NexTView Link'

This DVD recorder is equipped with the 'NexTView Link' feature. If your television is also equipped with this function, you can mark TV programmes on the television for programming. These TV programmes will automatically be transmitted to a TIMER block on the DVD recorder. If you clear the marking of the TV programme on the television, the corresponding TIMER block on the DVD recorder will also be cleared.
For more information, read the instruction manual of your TV set.

Problem solving for programmed recordings

PROBLEM	SOLUTION
The DVD recorder is not responding	✓While a programmed recording is being made, you cannot operate your DVD recorder manually. If you want to cancel the programmed recording, press **STANDBY** ⏻ .
'*Switch off, timer recording*' flashes on the TV screen.	✓The DVD recorder was switched on a few minutes before the start of a programmed recording. Switch off the DVD recorder using **STANDBY** ⏻ . A programmed recording (timer) will only function if the DVD recorder is switched off (**STANDBY** ⏻ button).
Error message: '*Insert recordable disc*'	✓Either a disc has not been inserted or the disc cannot be used for recording. Insert a disc on which recordings can be made. Search the position on the disc where you want the recording to begin. Switch off the DVD recorder using **STANDBY** ⏻ .
The error message '*Disc locked*' appears briefly on the screen.	✓A write-protected disc has been inserted. Undo the write protection (see 'Preventing accidental erasing of discs' in 'Manual recording') or insert a different disc.
Error message: '*Memory full*'	✓If this error message appears after pressing **TIMER** ⏲ , then all TIMER blocks are already programmed. No more recordings can be programmed. Press the ▶ button. If you want to clear or check a programmed recording (TIMER block), select it with ▲ or ▼ .
The '*Data error*' message appears on the screen.	✓The data for the recording could not be transferred. Please check date, start time and finish time of the programmed recording.
The '*Collision*' message appears on the screen.	✓Two programmed recordings overlap. ✓If you ignore this error message the show with the earlier start time will be recorded first. The start of the second show will not be recorded. ✓Change the setting for either of the two recordings. ✓Clear either of the two recordings

13 User preferences

In this section you will learn how to set your user preferences on the DVD recorder. The symbols have the following meanings:

Picture setting

Sound setting

Language setting

Additional settings

Remote control settings
Control the DVD recorder using the remote control of your Philips TV set

Disc settings

Recording settings

Installation

❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Press **SYSTEM-MENU** on the remote control. The menu bar appears.

❸ Select 'ꟻ' using ◀ or ▶ and confirm with ▼ .

❹ Select the appropriate function with ▼ or ▲ and confirm with ▶ .

❺ Select the appropriate line using ▼ or ▲ and confirm with ▶ .

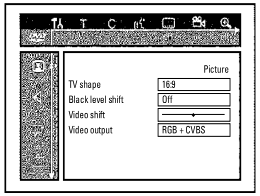
❻ Select the appropriate function using ▼ or ▲ or the setting with ◀ or ▶ .

❼ Confirm the new setting by pressing **OK** .

❽ To close the menu item, press ◀ .

Picture settings

You can choose the following features in this menu:


Picture
TV shape 16:9
Black level shift Off
Video shift
Video output RGB + CVBS

'TV shape'

The picture signal from your DVD Recorder can be set to match your TV screen.

'***4:3 letterbox***': for a 'wide-screen' picture with black bars at the top and bottom
'***4:3 panscan***': for a full-height picture with the sides trimmed.
'***16:9***' : for a wide-screen TV set (screen edge ratio 16:9)

'Black level shift'

Adapts the colour dynamics for NTSC playback when switched to '***On***'

ENGLISH

'Video shift'

Use this feature to adjust the position of the picture on your TV left or right using ◀ , ▶ to suit your TV set.

'RGB attenuation'

With the buttons ◀ , ▶ you can attenuate or boost the RGB-signal on the input socket **EXT 2 AUX-I/O** These setting concerns only the input signal. The RGB output signal on the socket **EXT 1 TO TV-I/O** leaves unchanged.

'Video output'

Since RGB and S-Video signals sometimes use the same connections on a scart cable, the two signals cannot be transmitted simultaneously. With these settings, you can decide whether RGB or S-Video signals should be transmitted. This setting affects only the scart sockets of the DVD recorder (**EXT 1 TO TV-I/O** output socket and **EXT 2 AUX-I/O** input socket).
Please also observe which signals are available at which scart socket of the TV set or how the scart sockets need to be switched.
If necessary, consult the instruction manual of your TV set.

Which settings can I select?

'***RGB + CVBS***' Depending on the TV set you are using, switching between the 'RGB' and the 'Video(CVBS/FBAS)' signal is done automatically. If the picture scrolls to the side or the colour quality is poor on some TV sets when the setting is '***RGB + CVBS***', you must select '***CVBS only***'.

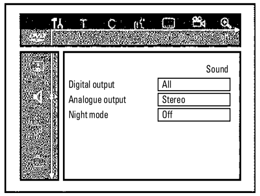
'***S-video only***' Both scart sockets (**EXT 1 TO TV-I/O** output socket and **EXT 2 AUX-I/O** input socket) process only the S-Video signal. In case the scart socket of the TV set is not suitable for S-Video (Y/C) signals, you will only see a black-and-white picture, although the recording will be made in colour. Moreover, only the video (CVBS, FBAS) signal will be used for recordings via the **EXT 1 TO TV-I/O** scart socket. Please observe that when making recordings from a video recorder that transmits only video (CVBS/FBAS) signals through the scart cable, recordings via scart socket **EXT 2 AUX-I/O** may be made in black and white. Therefore, use this setting with caution.

'***CVBS only***' Only the video (CVBS/FBAS) signal is transmitted regardless of the video signals (RGB, Y/C) on the scart sockets. This setting is selected automatically when no 'RGB' or 'S-VIDEO' signal is detected at the scart socket.

When selecting the settings '***S-video only***' or '***CVBS only***', the RGB signal is switched off.

Sound settings

Depending on which audio outputs are used, you can select the settings in this menu.
If you only use the analogue audio output (**AUDIO L/R OUT**), select the settings '***Off***' in the '***Digital output***' menu.



Digital output: All
Analogue output: Stereo
Night mode: Off

'*Digital output*'

You can select one of the following settings for devices that are connected to the **COAX OUT** or **OPTICAL AUDIO OUT** sockets:

'***All***': Dolby Digital and DTS signals are fed unaltered to the digital output. MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation).
For receivers/amplifiers **with digital multi-channel sound decoders**.

'***PCM only***: Dolby Digital and MPEG-2 multi-channel signals are converted to PCM (Pulse Code Modulation).
For receivers/amplifiers **without digital multi-channel sound decoders**.

'***Off***: Digital output switched off.
For devices **with analogue audio input**.

'*Analogue output*'

For devices connected to the analogue audio output (**AUDIO L/R OUT**), you can select from the following settings.

'***Stereo***': For devices without DolbySurround or TruSurround. Use this setting if the DVD recorder is only connected to a stereo TV set.

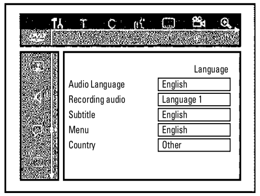
'***Surround***: Dolby Digital and MPEG-2 multi-channel are mixed down to a DOLBY surround-compatible two-channel output signal.
For devices **with Dolby Surround Pro Logic decoder** .

'*Night mode*'

Night mode optimises the sound for playback at low volume. You are therefore less likely to disturb your neighbours. This only works for Dolby Digital audio on DVD video discs.

Language settings

You can choose the following settings in this menu:



Audio Language: English
Recording audio: Language 1
Subtitle: English
Menu: English
Country: Other

'*Audio Language*'

Playback audio language

'*Recording audio*'

Selection of audio recording for bilingual programmes

'*Subtitle*'

Subtitle language

'*Menu*'

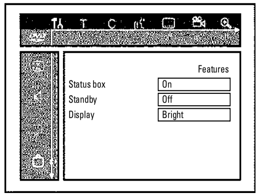
Screen menu language

'*Country*'

Select the country you currently live from the list

Additional settings

You can select the following functions in this menu:



Status box: On
Standby: Off
Display: Bright

'*Status box*'

Along with the on screen menu, the OSD (On Screen Display) also displays information on the current operating status (counter, playback, recording, TV channel, etc.) on the TV screen.
You can switch off the information about the operating status so that the on screen display (OSD) is not recorded during copying.

'***On***': The OSD information appears in every selected mode for a few seconds and disappears again.

'***Off***': The OSD information is switched off. It is **no longer** displayed on the screen.

'*Live source view*'

With this function you can switch between the live picture or the information of the selected TV channel/input socket in the 'Tuner information box' (left-hand corner of the screen).

'***On***': The live picture of the selected TV channel or signal on the input sockets is visible.

'***Off***': The information about the selected TV channel or signal on the input sockets is visible.

'*Auto standby*'

If you haven't used the DVD-recorder for a few minutes in certain modes (e.g.: STOP), it will switch to standby automatically. You can cancel this function to use the DVD-recorder as a television receiver. '***On***': The DVD-Recorder leave switched on.

'***Off***': The DVD-Recorder will be switched to standby.

'*Standby*'

To save power, you can switch off the clock display on the DVD recorder. Programmed (TIMER) recordings will still take place.
In addition, you can present the most important features of the DVD recorder in scrolling text in the display (demo).

'***Low power***': If the DVD-Recorder is switched off (button **STANDBY** ⏻), the clock display is also switched off.

'***Off***': If the DVD-Recorder is switched off (button **STANDBY** ⏻), the clock display is visible.

'***Demo mode***': If the DVD recorder is switched off with the **STANDBY** ⏻ button, a list of the most important features is shown in the display.

'*Display*'

You can change the brightness of the display on the DVD recorder. This setting only affects the DVD recorder when it is switched on.
You can also adjust this setting with the **DIM** button on the remote control.

'***Bright***': The display appears with normal brightness.

'***Dimmed***': The display appears less bright.

'***Off***': The display is switched off.

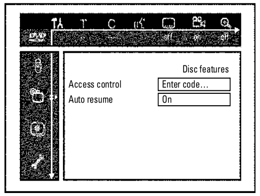
Remote Control settings

In this menu you can set the remote control type to which your DVD recorder should respond.

'***DVD player***': The DVD recorder responds to the supplied remote control and the remote control of a DVD player (remote control code RC-6).
Choose this setting if your Philips TV remote supports DVD functions.
'***DVD recorder***': The DVD recorder only responds to the supplied remote control.

Disk feature menu

In this menu you can make the changes that relate to the disc:



Disc features

Access control Enter code...

Auto resume On

'*Access control*'

Please read the next chapter on 'Access control (child lock)'.

'*Auto resume*'

If playback of a pre-recorded DVD video disc or video CD is interrupted (button **STOP ■** or **OPEN/CLOSE ⏏**) when the disc is reloaded (disc is started) playback starts at the precise location where it stopped. This applies not only to the current disc but to the last 20 discs played.

This feature can be switched off if not required.

'*PBC*'

This line appears only if a VCD is loaded.
This function lets you activate or deactivate the PBC menu (Playback Control) for video CDs. See 'Playing a (Super) Video CD'.

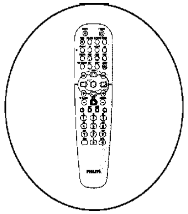
'*Finalise disc*'

This feature allows you to finalise DVD+R discs. If the disc has already been finalised this line will appear darker.

'*Adapt disc format*'

If a DVD+RW has been recorded in a computer drive or in another DVD recorder the index screen may not be displayed correctly.
This feature allows you to change the format of the disc.
It is therefore only visible if the disc format is different.

14 Access control (Child Lock)



Child lock (DVD and VCD)

This feature enables discs to be locked for children.
When Child Lock is on, a 4-digit code (PIN) needs to be entered before a disc can be played.
You can also decide whether the inserted disc should always be played or should be played only once, despite the child lock

•)'*Play always*':
This disc is stored in a memory with space for 50 child-safe discs. If more than 50 discs are stored, the last disc in the list is removed and the new disc is added. The screen shows 'Child safe' at the start of playback.

•)'*Play once*':
This disc is only authorised for single playback. If the recorder is switched off, the PIN code must be re-entered.

Activating/deactivating child lock

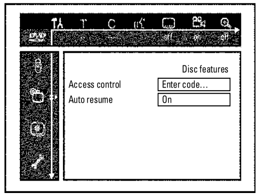
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** . The menu bar appears

❹ Select the '⚙' icon using ◀ or ▶ .

❺ Select '🗀(***Disc features***)' using ▼ or ▲ and confirm with ▶ .



❻ Confirm '***Access control***' using ▶ .

❼ Enter a 4-digit code of your choice. If the code is new, you may have to enter the code a second time as confirmation.

❽ Select '***Child lock***' using ▲ or ▼ and confirm with ▶ .

❾ Select the '🔒' icon using ▼ or ▲ .

❿ Confirm with **OK** .

⓫ Quit the feature using ◀ and **SYSTEM-MENU** .

Unauthorised discs can only be played by entering the four-digit PIN code.
To deactivate the child lock, select the '🔓' icon in ❾ .

Authorising a disc

❶ Insert a disc. The access control box will appear after a short delay.

❷ Using ▲ or ▼ select '***Play once***' or '***Play always***'.

❸ Enter your PIN code using the number buttons **0..9/abc** .

Double-sided DVDs may have a different ID for each side. For these discs, each side must be authorised. Video CDs may have a different ID for each disc. For these CDs, each disc must be authorised.

Locking unlocked discs

To lock a disc that was formerly authorised follow the instructions below

❶ Insert a disc. Playback starts automatically. If the playback does not start automatically, press **PLAY▶** .

❷ Press the **STOP■** button while the 'safe' icon is visible. The icon changes to 'locked'. The disc is now locked.

Parental level control (DVD video only)

Films on pre-recorded DVD discs may contain scenes not suitable for children. Therefore, some discs may contain 'Parental Control' rating information that applies to the entire disc or to certain scenes on the disc.
The appropriate scenes have filter values that reach from 1-8. If such a scene is detected during playback, the filter value set on the DVD recorder is compared to the scene. If the filter value is higher than the setting, an alternative scene will be played (if available).
Most DVDs apply the rating to an entire DVD. Therefore, if certain scenes exceed the rating you select, the entire disc will be blocked from viewing.

Activating/deactivating parental level control

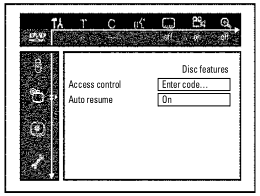
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** . The menu bar appears

❹ Select the '⚙' icon using ◀ or ▶ .

❺ Select '🗀(***Disc features***)' using ▼ or ▲ and confirm with ▶ .


Disc features

Access control: Enter code...

Auto resume: On

❻ Confirm '***Access control***' using ▶ .

❼ Enter a 4-digit code of your choice. If the code is new, you may have to enter the code a second time as confirmation.

❽ Select the '***Parental level***' using ▲ or ▼ and confirm with ▶ . A bar appears to select the parental level.

❾ Select the appropriate rating using ▼ , ▲ or the number buttons **0..9/abc** .


Tip

What do the ratings mean?
Rating 0 (displayed as '--') parental control not active.
Rating 1 (suitable for children)
Rating 8 (only suitable for adults)

What happens if a DVD scene contains a higher level than the rating set?
If the recorder does not find a suitable alternative, playback will stop and you must enter the four-digit code.

❿ Confirm with **OK** . Quit using ◀ and **SYSTEM-MENU** .

Changing the country

The set filter values depend on the respective country. It is therefore necessary to enter the country to which these filter values apply.

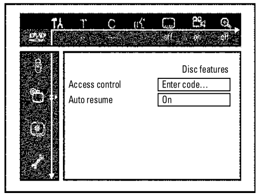
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** . The menu bar appears

❹ Select the '𝕋⅄' icon using ◀ or ▶ .

❺ Select line '(***Disc features***)' using ▼ or ▲ and confirm with ▶ .


Disc features

Access control: Enter code...

Auto resume: On

❻ Confirm the line '***Access control***' using ▶ .

❼ Enter your four-digit code. If the code is new, you may have to enter the code a second time as confirmation.

❽ Select '***Change country***' using ▼ or ▲ and confirm with ▶ .

❾ Select the corresponding country using ▲ or ▼ and confirm with **OK** .

❿ To end, press ◀ and then **SYSTEM-MENU** .

Changing the PIN code

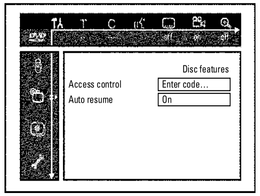
❶ Switch on the TV set. If required, select the programme number for the DVD recorder.

❷ Switch on the DVD recorder using **STANDBY-ON** ⏻ .

❸ Press **SYSTEM-MENU** . The menu bar appears

❹ Select the '𝕋⅄' icon using ◀ or ▶ .

❺ Select '(***Disc features***)' using ▼ or ▲ and confirm with ▶ .


Disc features

Access control: Enter code...

Auto resume: On

❻ Confirm '***Access control***' using ▶ .

❼ Enter your four-digit PIN code. If the code is new, you may have to enter the code a second time as confirmation.

❽ Select '***Change code***' using ▲ or ▼ and confirm with ▶ .

❾ Enter the new code using the number buttons **0..9/abc** . Enter the same code again as confirmation.

❿ Quit using ◀ and **SYSTEM-MENU** .


Tip

I have forgotten my code
Press **STOP** ■ four times (step ❼), then press **OK** . Access control is now switched off. You can now enter a new code as described above.

4. Mechanical Instructions

4.1 Dismantling and Assembly of the Set

Remark: Exploded views can be found in chapter 10.

4.1.1 Manually opening the tray

- In case the loader is defective or cannot be opened electrically you can open the tray manually.
- Through a slot at the underside of the cabinet a slider that unlocks the tray can be accessed.
  However the slot is covered by an adhesive tape on the cabinet of the drive to prevent dust coming into the drive. Push through this adhesive tape by means of a thin screwdriver and move the slider to the left, see picture 4-1.
- **Make sure that an adhesive tape has been reapplied to the drive when repair is finished!**

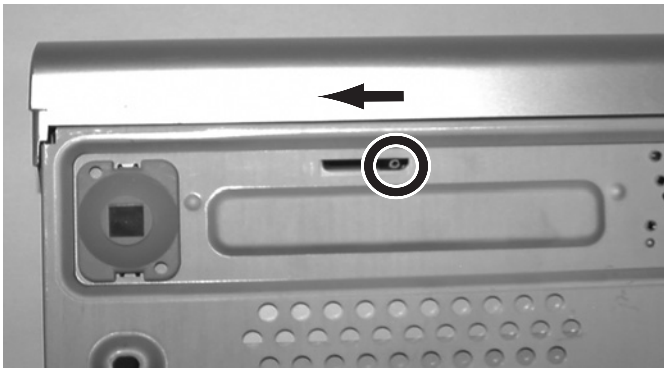


Figure 4-1

4.1.2 Front

- Before removing the front panel the tray has to be in the opened position.
- Remove the top cover
- Remove tray front by pulling it upwards (1), see picture 4-2
- Unplug the IDE cable that connects to the card reader (2), see picture 4-3
- Remove the 2 screws (3) that fix the card reader
- Remove the card reader PCB (4)
- Remove the screw (5) that fixes the bracket of the card reader to the front plate, see picture 4-4
- Remove the three screws (6) fixing the front panel
- Release the cables from the clamps (7)
- Release the two snap hooks at the sides (8) and remove the front (9), see picture 4-5
- Remove the 9 screws (10) to remove the front plate (11), see picture 4-6, 4-7

Figure 4-2

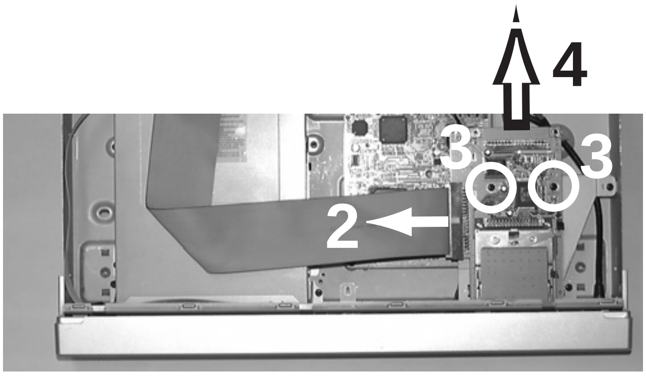


Figure 4-3

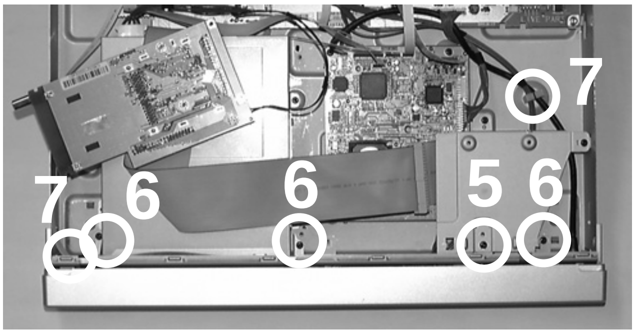


Figure 4-4

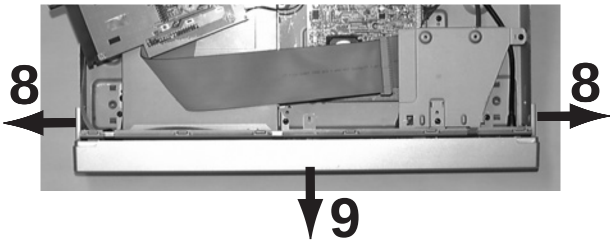


Figure 4-5

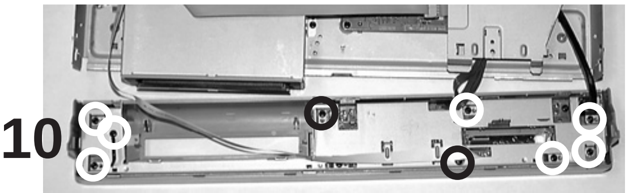


Figure 4-6

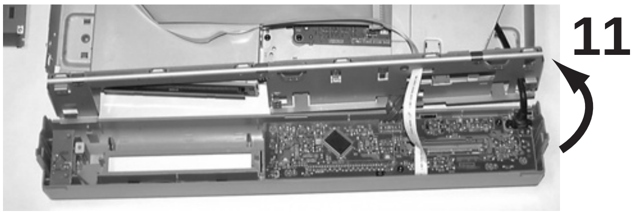


Figure 4-7

4.1.3 Digital Board

- Unplug the IDE cable that connects to the card reader (1), see picture 4-8
- Remove the 2 screws (2) that fix the card reader
- Remove the card reader PCB (3)
- Remove the 3 screws (4) that fix the bracket of the card reader, see picture 4-9.
- Remove the 4 screws (5) that fix the Digital Board, see picture 4-10, and turn the Digital Board to the required service position, see picture 4-11

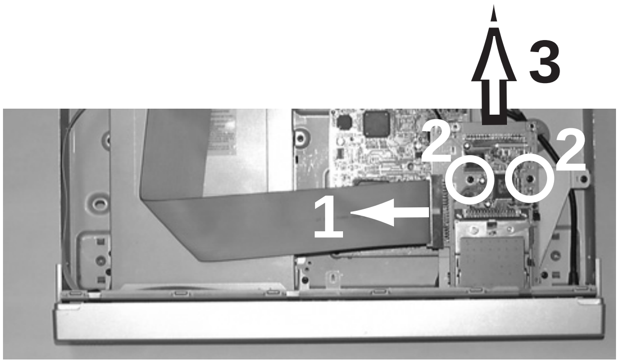


Figure 4-8

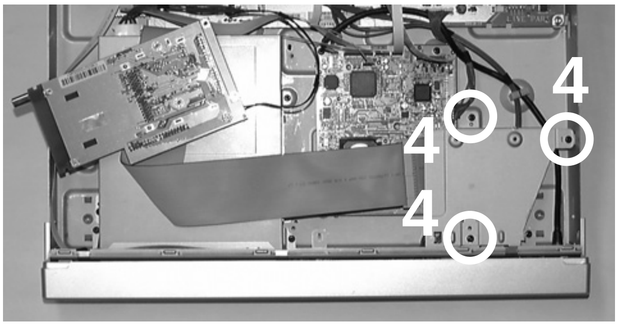


Figure 4-9

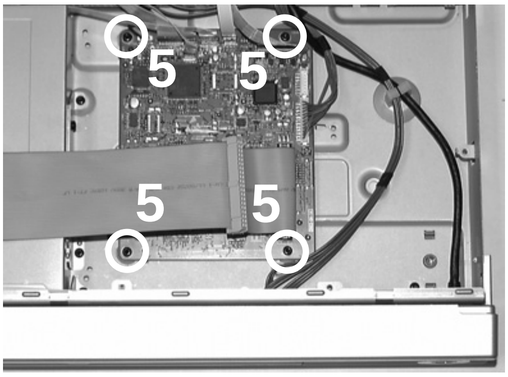


Figure 4-10

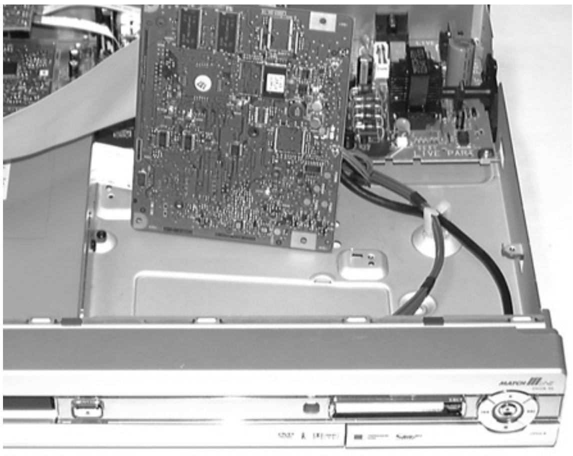


Figure 4-11

4.1.4 Basic Engine

- Remove the tray, see picture 4-2
- Remove the 4 screws that fix the drive, see picture 4-12

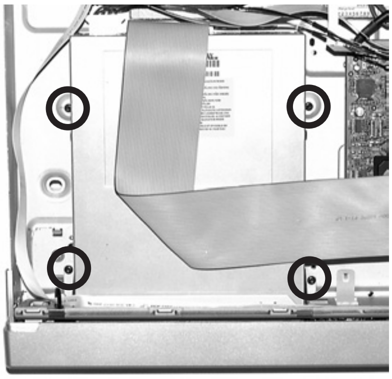


Figure 4-12

4.1.5 Analog Board

- Remove the 3 screws (1) that fix the back plate to the bottom plate, see picture 4-13
- Remove the 4 screws (2) that fix the Analog Board to the bottom plate
- Remove the Fan assy by releasing the fixing screw (3)
- Remove screw safety holder (4)
- Unlock the two snaps hooks at the left and right (5), see picture 4-14, and pull the board and backplate out gently (6)
- Turn the PCB in the service position (7), see picture 4-15

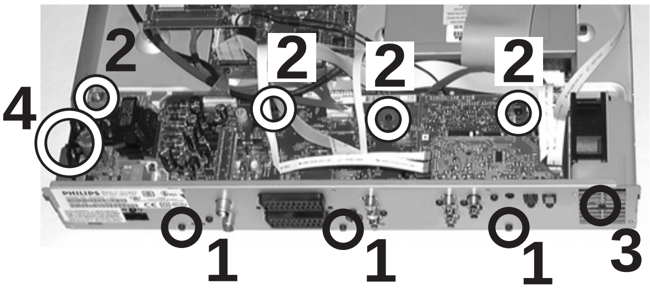


Figure 4-13

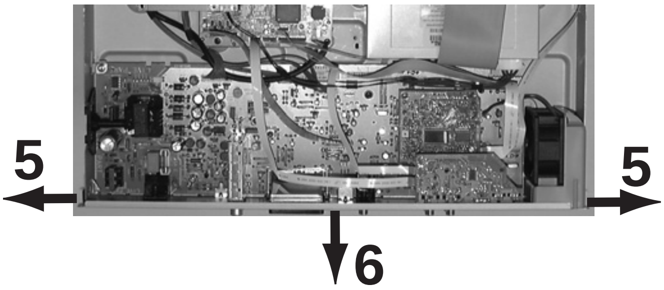


Figure 4-14

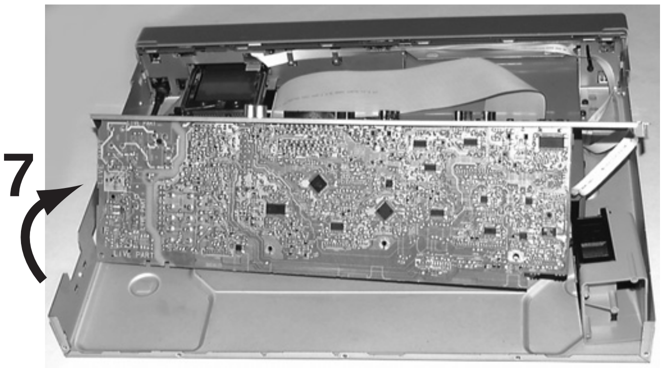


Figure 4-15

5. Diagnostic Software

Due to the complexity of the DVD recorder, the time to find a defect in the recorder can become long. To reduce this time, the recorder has been equipped with Diagnostic and Service software (DS). The DS offers functionality to diagnose the DVDR hardware and tests the following:

- Interconnections between components
- Accessibility of components
- Functionality of the audio and video paths

This functionality can be accessed via several interfaces:

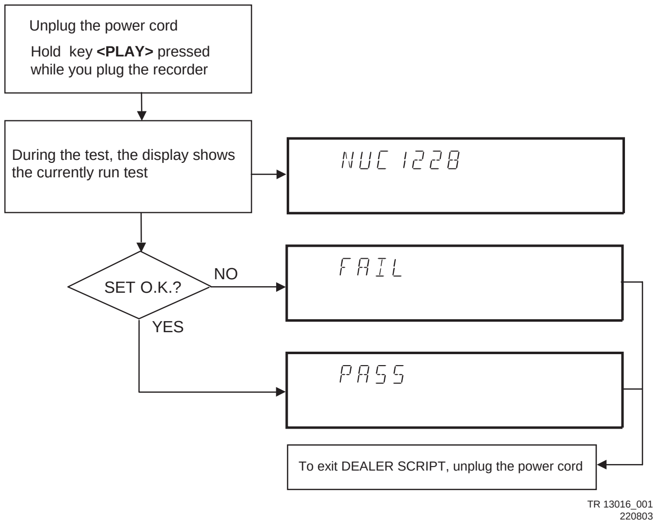
1. End user/Dealer script interface
2. Command Interface

5.1 End User/Dealer Script Interface

5.1.1 Description

The End user/Dealer script interface gives a diagnosis on a stand alone DVD recorder. During this mode, a number of hardware tests (nuclei) are automatically executed to check if the recorder is faulty. The diagnosis is simply a "fail" or "pass" message. If the message "FAIL" appears on the display, there is apparently a failure in the recorder. If the message "PASS" appears, the nuclei in this mode have been executed successfully. There can be still a failure in the recorder because the nuclei in this mode don't cover the complete functionality of the recorder.

5.1.2 Structure



TR 13016_001
220803

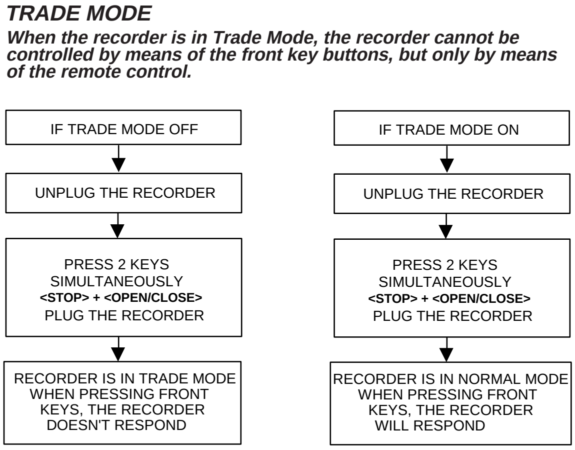
Figure 5-1

The End use/Dealer script executes all diagnostic nuclei that do not need any user interaction and are meaningful on a standalone DVD recorder.

5.1.3 Contents

Included tests:	1.DS_ANAB_COMMUNICATIONECHO_NUC 2.DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC 6. DS_CHR_INT_PIC_NUC 7. DS_CHR_DMA_NUC 8. DS_BROM_WRITEREAD_NUC 9. DS_NVRAM_COMMUNICATION_NUC 10. DS_NVRAM_WRITEREAD_NUC 11. DS_SDRAM_WRITEREADFAST_NUC 12. DS_FLASH_WRITEREAD_NUC 13.DS_FLASH_CHECKSUMPROGRAM_NUC 14.DS_SYS_HARDWAREVERSIONGET_NUC 15. DS_VIP_DEVTYPEGET_NUC 16. DS_VIP_COMMUNICATION_NUC 17. DS_DVIO_LINKDEVTYPEGET_NUC 18. DS_DVIO_PHYDEVTYPEGET_NUC 19. DS_DVIO_LINKCOMMUNICATION_NUC 20. DS_DVIO_PHYCOMMUNICATION_NUC 21.DS_PSCAN_COMMUNICATIONDENC_NUC 22.DS_PSCAN_COMMUNICATIONDEINTERLACER_NUC 23. DS_BE_COMMUNICATIONECHO_NUC 24.DS_ANAB_COMMUNICATIONIICNVRAM_NUC 25.DS_ANAB_COMMUNICATIONIICTUNER_NUC 26.DS_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC 27.DS_ANAB_COMMUNICATIONIICAVSELECTOR_NUC 28. DS_ANAB_CHECKSUMPROGRAM_NUC

5.2 Trade Mode



CL 16532095_071.eps
150801

Figure 5-2

5.3 Virgin mode

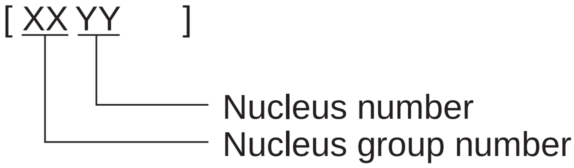
If you want that the recorder starts up in Virgin mode, follow this procedure:

- Unplug the recorder
- plug the recorder again while you keep the STAND BY/ON key pressed
- the set starts up in Virgin mode.

5.4 Command Mode Interface

5.4.1 Nuclei Numeration

Each nucleus has a unique number of four digits. This number is the input of the command mode.



CL 06532152_012.eps
051200

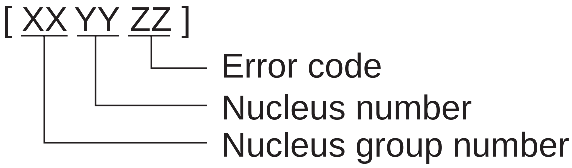
Figure 5-3

The following groups are defined for Digital Board Chrysalis:

Group number	Group name
0	Basic / Scripts
1	Chrysalis
2	Boot EEPROM
3	NVRAM
4	SDRAM
5	Flash
6	Video Input Processor
7	DVIO
8	Progressive Scan
9	Basic Engine
10	Display and Control Board
11	Analogue Board
12	System

5.4.2 Error Handling

Each nucleus returns an error code. This code contains six numerals, which means:



CL 06532152_013.eps
051200

Figure 5-4

The nucleus group numbers and nucleus numbers are the same as above.

5.4.3 Command Mode Interface

Set-Up Physical Interface Components

Hardware required:

- Service PC
- one free COM port on the Service PC
- special cable to connect DVD recorder to Service PC

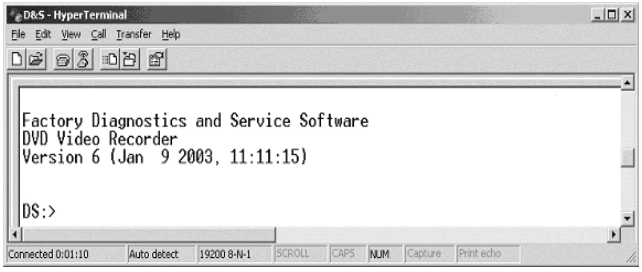
The service PC must have a terminal emulation program (e.g. Hyperterminal) installed and must have a free COM port (e.g. COM1). Activate the terminal emulation program and check that the port settings for the free COM port are: 19200 bps, 8 data bits, no parity, 1 stop bit and no flow control. The free COM port must be connected via a special cable to the RS232 port of the DVD recorder. This special cable will also connect the test pin, which is available on the connector, to ground (i.e. activate test pin).

Code number of PC interface cable: 3122 785 90017

Activation Digital Board Chrysalis

1. Pull the mains cord from the recorder and reconnect it again (reboot).
2. The next welcome message will appear on the PC:

Startup screen



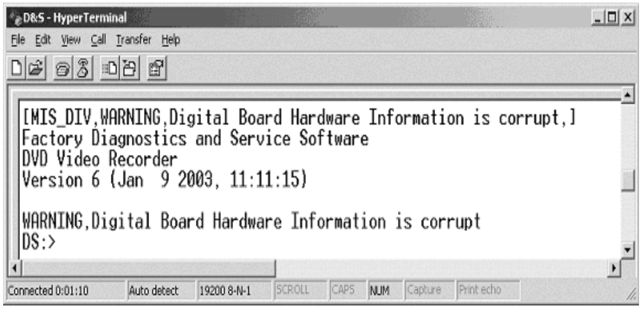
```
Factory Diagnostics and Service Software
DVD Video Recorder
Version 6 (Jan  9 2003, 11:11:15)

DS:>
```

Figure 5-5

Now, the prompt 'DS:>' will appear. The diagnostic software is now ready to receive commands. The commands that can be given are the numbers of the nuclei. If you see above shown screen, continue with paragraph 'Nuclei Codes'.

3. It is possible that the next messages will appear when starting the DVD+RW for the first time

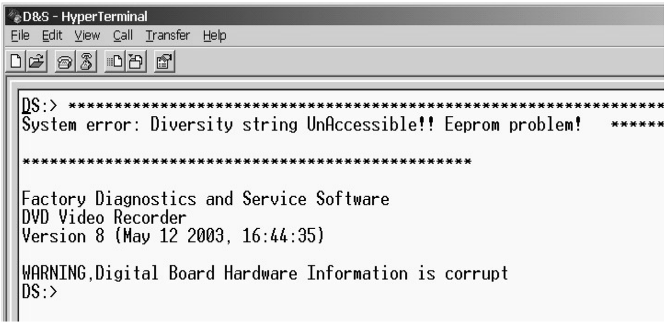
Error messages startup



```
[MIS_DIV,WARNING,Digital Board Hardware Information is corrupt,]
Factory Diagnostics and Service Software
DVD Video Recorder
Version 6 (Jan  9 2003, 11:11:15)

WARNING,Digital Board Hardware Information is corrupt
DS:>
```

Figure 5-6a

Error messages D&S program

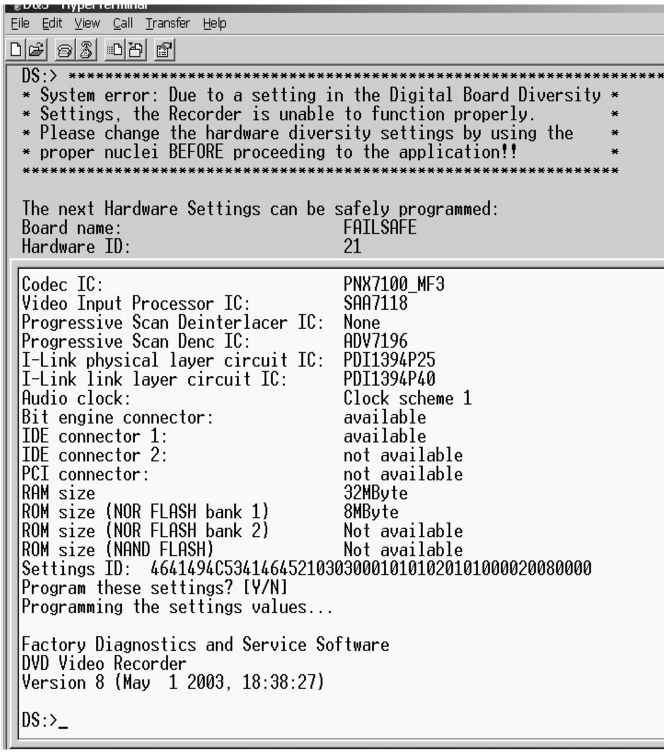


```
DS:> ********************************************************************
System error: Diversity string UnAccessible!! Eeprom problem!   ******

*************************************************

Factory Diagnostics and Service Software
DVD Video Recorder
Version 8 (May 12 2003, 16:44:35)

WARNING,Digital Board Hardware Information is corrupt
DS:>
```

Figure 5-6b

In these cases, the boot EEPROM of the Chrysalis Digital Board does not contain the required string with the hardware information. To update the Digital Board with the correct string, nucleus 1226 must be executed.

See next section 'Diversity String Input'.
There can also be the next error message.



```
DS:> *******************************************************************
* System error: Due to a setting in the Digital Board Diversity *
* Settings, the Recorder is unable to function properly.        *
* Please change the hardware diversity settings by using the    *
* proper nuclei BEFORE proceeding to the application!!          *
*****************************************************************

The next Hardware Settings can be safely programmed:
Board name:                        FAILSAFE
Hardware ID:                       21

Codec IC:                          PNX7100_MF3
Video Input Processor IC:          SAA7118
Progressive Scan Deinterlacer IC:  None
Progressive Scan Denc IC:          ADV7196
I-Link physical layer circuit IC:  PDI1394P25
I-Link link layer circuit IC:      PDI1394P40
Audio clock:                       Clock scheme 1
Bit engine connector:              available
IDE connector 1:                   available
IDE connector 2:                   not available
PCI connector:                     not available
RAM size                           32MByte
ROM size (NOR FLASH bank 1)        8MByte
ROM size (NOR FLASH bank 2)        Not available
ROM size (NAND FLASH)              Not available
Settings ID:  4641494C5341464521030300010101020101000020080000
Program these settings? [Y/N]
Programming the settings values...

Factory Diagnostics and Service Software
DVD Video Recorder
Version 8 (May  1 2003, 18:38:27)

DS:>_
```

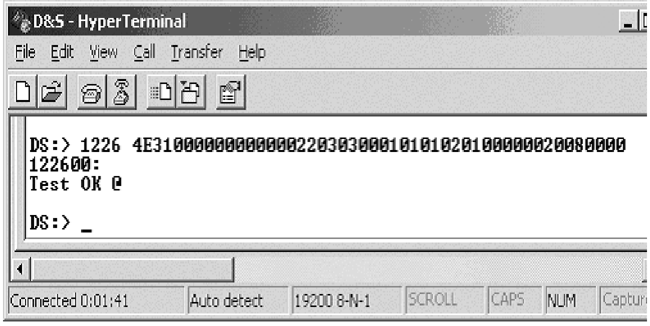
Figure 5-6c

Enter "Y" to program a safe string. With this automatically generated string the board will work in principle but it has to be checked if all board settings were detected correctly.

Diversity String Input

4. Execute nucleus 1226 to enter the string. Please see adjustment instructions in chapter 8 for details

Nucleus 1226 execution with string

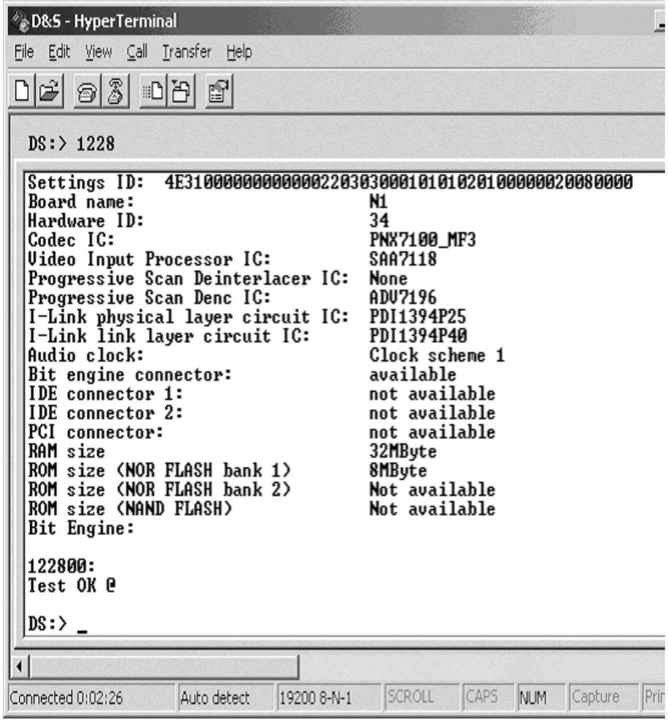


```
DS:> 1226 4E3100000000000022030300010101020100000020080000
122600:
Test OK @

DS:> _
```

Figure 5-7

5. To check if the hardware info is filled correctly, you can execute nucleus 1228.

Nucleus 1228 info example



```
DS:> 1228

Settings ID:  4E3100000000000022030300010101020100000020080000
Board name:                        N1
Hardware ID:                       34
Codec IC:                          PNX7100_MF3
Video Input Processor IC:          SAA7118
Progressive Scan Deinterlacer IC:  None
Progressive Scan Denc IC:          ADV7196
I-Link physical layer circuit IC:  PDI1394P25
I-Link link layer circuit IC:      PDI1394P40
Audio clock:                       Clock scheme 1
Bit engine connector:              available
IDE connector 1:                   not available
IDE connector 2:                   not available
PCI connector:                     not available
RAM size                           32MByte
ROM size (NOR FLASH bank 1)        8MByte
ROM size (NOR FLASH bank 2)        Not available
ROM size (NAND FLASH)              Not available
Bit Engine:

122800:
Test OK @

DS:> _
```

Figure 5-8

6. Exit the 'Terminal' program.

7. Reboot the DVD recorder to allow the software to start.

Command overview Digital Board Chrysalis

Below you will find an overview of the nuclei, their numbers, and their error codes. This overview is preliminary and subject to modifications.

Chrysalis (CHR)

Nucleus Name	**DS_CHR_DevTypeGet**
Nucleus Number	100
Description	Sends the device ID and the module ids and revisions of the PNX7100 (Chrysalis) to the stdout port.
User Input	None

Example

```
DS:> 100
Device ID  7100
Codec ID   PNX7100_MF2
F-BCU  (0x0102) 1.0 INTC   (0x011d) 1.0 PCI-XIO(0x0113) 1.0
SIF(0x013b) 1.0 EJTAG  (0x0104) 0.0    S-BCU  (0x0102) 1.0
BOOT (0x010a) 1.0 CONFIG (0x013f) 1.0 RESET  (0x0123) 1.0
DEBUG  (0x0116) 0.0    UART0  (0x0107) 0.1    UART1  (0x0107) 0.1
UART2  (0x0107) 0.1    UART3  (0x0107) 0.1    I2C0   (0x0105) 0.1
I2C1   (0x0105) 0.1    GPIO   (0x013c) 1.0    SYNC   (0x013a) 1.0
DISP0  (0xa015) 0.1    DISP1  (0xa00f) 0.0    OSD    (0x0136) 0.1
SPU    (0xa00e) 0.0    MIXER  (0x0137) 1.0    DENC   (0x0138) 0.1
CCIR   (0x0139) 1.0    VDEC   (0x0133) 0.1    PARSER (0xa00d) 0.0
DV     (0xa00c) 0.0    BEI    (0xa00a) 0.0    IDE    (0xa009) 0.0
SGDX   (0xa008)0.0    BYTE   (0xa00b) 0.0    OUTPUT (0xa003) 0.0
ACOMP  (0xa000) 0.0    VFE    (0xa001) 0.0    VCOMP  (0xa002) 0.0
SCR    (0x0000) 0.0 SIFF   (0xa011) 0.0 WMD    (0xa010) 0.0
AUDIO0 (0xa015) 0.1 AUDIO1 (0xa00f) 0.0 PSCAN  (0xa018) 0.0

010000:
Test OK @
```

Nucleus Name	**DS_CHR_TestImageOn**
Nucleus Number	101
Description	Generates a test-image of a selected video standard on selected video output on the digital board. When no input is given, the default values will be used. Use nucleus **DS_ANAB_VideoRouting** to route the video signal on the analogue board output
User Input	The user has to decide which test image, video standard and video output must be used: **Test image id:** 0 VERTICAL_COLOURBAR (default) 1 HORIZONTAL_COLOURBAR 2 WHITE 3 YELLOW 4 CYAN 5 GREEN 6 MAGENTA 7 RED 8 BLUE 9 BLACK 10 GRAY **Video standard:** PAL (default) NTSC **Video output:** ALL CVBS and YC and RGB (default) CVBS YC RGB YUV PSCAN progressive scan

Example

```
DS:> 101
010100:
Test OK @
DS:> 101 0 pal cvbs
010100:
Test OK @
DS:> 101 4 ntsc yc
010100:
Test OK @
```

Nucleus Name	**DS_CHR_TestImageOff**
Nucleus Number	102
Description	Switches the test-image off.
User Input	None

Example	DS:> 102 010200: Test OK @

Nucleus Name	**DS_CHR_SineOn**
Nucleus Number	103
Description	Generate an audio sine signal on the audio output of the digital board. Note: Left channel 6kHz, right channel 12 kHz sine. Make sure to route the signal first.
User Input	None
Example	DS:> 103 010300: Test OK @

Nucleus Name	**DS_CHR_SineOff**
Nucleus Number	104
Description	Stop generating the audio sine signal
User Input	None
Example	DS:> 104 010400: Test OK @

Nucleus Name	**DS_CHR_SineBurst**
Nucleus Number	105
Description	Generate an audio sine signal on the audio output of the digital board for 4 seconds.
	Note: Left channel 6kHz, right channel 12 kHz sine with some known hick-ups
User Input	None
Example	DS:> 105 010500: Test OK @

Nucleus Name	**DS_CHR_MuteOn**
Nucleus Number	106
Description	Mute the audio outputs of the digital board
User Input	None
Example	DS:> 106 010600: Test OK @

Nucleus Name	**DS_CHR_MuteOff**
Nucleus Number	107
Description	De-mute the audio outputs of the digital board
User Input	None
Example	DS:> 107 010700: Test OK @

Nucleus Name	**DS_CHR_DvLedOn**
Nucleus Number	108
Description	Check the connection to the DV-LED on the digital board by switching it on
User Input	None
Example	DS:> 108 010800: Test OK @

Nucleus Name	**DS_CHR_DvLedOff**
Nucleus Number	109
Description	Switch off the DV-LED on the digital board
User Input	None
Example	DS:> 109 010900: Test OK @

Nucleus Name	**DS_CHR_MacroVisionOn**
Nucleus Number	110
Description	Turn on MacroVision.
User Input	None
Example	DS:> 110 011000: Test OK @

Nucleus Name	**DS_CHR_MacroVisionOff**
Nucleus Number	111
Description	Turn off MacroVision.
User Input	None
Example	DS:> 111 011100: Test OK @

Nucleus Name	**DS_CHR_Peek**
Nucleus Number	112
Description	Peek a value on a specified address
User Input	The address to peek on
Example	DS:> 112 0xa0700000 011200: Value read = 0x000001BD Test OK @

Nucleus Name	**DS_CHR_Poke**
Nucleus Number	113
Description	Poke a value on a specified address
User Input	The address to poke and the value: <address><value>
Example	DS:> 113 0xa0700000 0xaabbccdd 011300: Test OK @

Nucleus Name	**DS_CHR_INT_PICInterrupts**
Nucleus Number	114
Description	Test all interrupts of the priority interrupt controller
User Input	-
Example	DS:> 114 011400: Test OK @

Nucleus Name	**DS_CHR_DMA_TestDMA**
Nucleus Number	115
Description	Test the memory to memory DMA transfer
User Input	-
Example	DS:> 115 011500: Test OK @

Boot EEPROM (BROM)

Nucleus Name	**DS_BROM_Communication**
Nucleus Number	200
Description	Check the communication between the IIC controller of the Chrysalis and the boot EEPROM
User Input	None
Example	DS:> 200 020000: Test OK @

Nucleus Name	**DS_BROM_WriteRead**
Nucleus Number	201
Description	Check whether the Boot EEPROM can be written to and read from
User Input	None

Example	DS:> 201 020100: Test OK @

NVRAM

Nucleus Name	**DS_NVRAM_Communication**
Nucleus Number	300
Description	Check the communication between the IIC controller of the Chrysalis and the EEPROM
User Input	None
Example	DS:> 300 030000: Test OK @

Nucleus Name	**DS_NVRAM_WriteRead**
Nucleus Number	301
Description	Check whether the EEPROM can be written to and read from
User Input	None
Example	DS:> 301 030100: Test OK @

Nucleus Name	**DS_NVRAM_Clear**
Nucleus Number	302
Description	Make the EEPROM empty, containing all zeroes.
User Input	None
Example	DS:> 302 030200: Test OK @

Nucleus Name	**DS_NVRAM_Modify**
Nucleus Number	303
Description	Modifies one or more locations in NVRAM and updates the checksum of the section modified
User Input	1. The location that must be modified i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWNLOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and data which to put on the selected location <offset> <length> <data>
Example	DS:> 303 DIAGNOSTICS 5 1 0x5a 030300: Section is modified successfully Test OK @

Nucleus Name	**DS_NVRAM_Read**
Nucleus Number	304
Description	Read out one or more locations in the NVRAM
User Input	1. The location which must be read i.e. "ALL" "BOOT" "DIAGNOSTICS" "DOWN LOAD" "CONFIG" "RECORDER" or no string if an offset from the base address of the NVRAM is required 2. The offset and number of bytes to read <offset> <length>
Example	304 DIAGNOSTICS 0 6 030400: Value read = 0x00 0x00 0x00 0x00 0x00 0x5A Test OK @

SDRAM

Nucleus Name	**DS_SDRAM_WriteRead**
Nucleus Number	400
Description	Check all data lines, address lines and memory locations of the SDRAM
User Input	None
Example	DS:> 400 040000: Test OK @

Nucleus Name	**DS_SDRAM_WriteReadFast**
Nucleus Number	401

Description	Check all data lines and address lines of the SDRAM
User Input	None
Example	DS:> 401 040100: Test OK @

Nucleus Name	**DS_SDRAM_Write**
Nucleus Number	402
Description	Write to a specific memory address
User Input	1. The location that must be modified (SDRAM starts at address 0xA0000000) 2. The value to put on the selected location
Example	DS:> 402 0xa1000010 0xad112222 040200: Test OK @

Nucleus Name	**DS_SDRAM_Read**
Nucleus Number	403
Description	Read from a specific memory address
User Input	The location from which the data must be read (SDRAM starts at address 0xA0000000)
Example	DS:> 403 0xa1000010 040300: Value read = 0xAD112222 Test OK @

FLASH

Nucleus Name	**DS_FLASH_DevTypeGet**
Nucleus Number	500
Description	Get the device (revision) type information of the FLASH IC. (manufacturer and device ID)
User Input	None
Example	DS:> 500 050000: Found FLASH memory: Manufacturer ID: 0x01 Device ID : 0x01 Test OK @

Nucleus Name	**DS_FLASH_WriteRead**
Nucleus Number	501
Description	Check whether the FLASH can be written to and read from
User Input	None
Example	DS:> 501 050100: Test OK @

Nucleus Name	**DS_FLASH_Read**
Nucleus Number	502
Description	Read from a specific memory address in FLASH
User Input	The location from which data must be read (FLASH starts at address 0xB8000000)
Example	DS:> 502 0xb8000000 050200: Value read = 0x3C08A000 Test OK @

Nucleus Name	**DS_FLASH_ChecksumProgram**
Nucleus Number	503
Description	Check the checksum of the application partitions by recalculating and comparing partition checksums
User Input	None
Example	DS:> 503 050300: BootCode checksum is: 0xBABE5B6F, which is correct Diagnostics checksum is : 0xBABEBAFF, which is correct Download checksum is: 0xBABEEDBF, which is correct Application checksum is : 0xBABE8EEC, which is correct Test OK @

Nucleus Name	**DS_FLASH_CalculateChecksum**
Nucleus Number	504
Description	Calculate the checksum over all memory addresses. Used to check entire FLASH contents
User Input	None
Example	DS:> 504 050400: The Checksum = 0xBABE30A4 Test OK @

Nucleus Name	**DS_FLASH_CalculateChecksumFast**
Nucleus Number	505
Description	Calculate a checksum over a selected number of address locations
User Input	None
Example	DS:> 505 050500: The Checksum = 0xBABEB064 Test OK @

Video Input Processor (VIP)

Nucleus Name	**DS_VIP_DevTypeGet**
Nucleus Number	600
Description	Get the device (revision) type information of the VIP IC
User Input	None
Example	DS:> 600 060000: Found SAA7118 Test OK @

Nucleus Name	**DS_VIP_Communication**
Nucleus Number	601
Description	Check the communication between the IIC controller of the chrysalis and the VIP IC
User Input	None
Example	DS:> 601 060100: Test OK @

Nucleus Name	**DS_VIP_ClockOutputOn**
Nucleus Number	602
Description	Switch the clock output on
User Input	None
Example	DS:> 602 060200: Test OK @

Nucleus Name	**DS_VIP_ClockOutputOff**
Nucleus Number	603
Description	Switch the clock output off
User Input	None
Example	DS:> 603 060300: Test OK @

Nucleus Name	**DS_VIP_SelectInput**
Nucleus Number	604
Description	Select an input video path to be switched to the analogue output pin (AOUT) of the VIP
User Input	The input to select, see table below. 1 CVBS_Y_IN_A 2 CVBS_OUT_B 3 CVBS_Y_IN_B 4 CVBS_Y_IN_C 6 C_IN 8 G_IN 9 Y_IN 13 B_IN 14 U_IN 18 R_IN 19 V_IN

Example	DS:> 604 1 060400: Test OK @

Digital Video Input Output (DVIO)

Nucleus Name	**DS_DVIO_LinkDevTypeGet**
Nucleus Number	700
Description	Get the device (revision) type information of the 1394 Link layer IC
User Input	None
Example	DS:> 700 070000: Device type of the link layer IC: ffc00301 Test OK @

Nucleus Name	**DS_DVIO_PhyDevTypeGet**
Nucleus Number	701
Description	Get the device (revision) type information of the 1394 Physical layer IC
User Input	None
Example	DS:> 701 070100: Device type of the phy layer IC: 0 Test OK @

Nucleus Name	**DS_DVIO_LinkCommunication**
Nucleus Number	702
Description	Check the accessibility of the 1394 Link layer IC by writing to and reading from a specific address
User Input	None
Example	DS:> 702 070200: Test OK @

Nucleus Name	**DS_DVIO_PhyCommunication**
Nucleus Number	703
Description	Check the accessibility of the 1394 Physical layer IC by writing to and reading from a specific address
User Input	None
Example	DS:> 703 070300: Test OK @

Nucleus Name	**DS_DVIO_Routing**
Nucleus Number	704
Description	Route a DV stream containing an audio and video signal through the physical and link layer ICs to the Chrysalis
User Input	None, test works for both NTSC and PAL
Example	DS:> 704 070400: Test OK @

Nucleus Name	**DS_DVIO_DetectNode**
Nucleus Number	705
Description	Check whether a DV node can be detected by the hardware
User Input	None, test works for both NTSC and PAL
Example	DS:> 705 070500: Test OK @

Nucleus Name	**DS_DVIO_DetectStream**
Nucleus Number	706
Description	Check whether a DV stream can be detected by the hardware
User Input	None, test works for both NTSC and PAL
Example	DS:> 706 070600: Test OK @

Progressive Scan (PSCAN)

Nucleus Name	**DS_PSCAN_CommunicationDenc**
Nucleus Number	801
Description	Check the communication between the IIC controller of the chrysalis and the progressive scan DENC-IC
User Input	None
Example	DS:> 801 080100: Test OK @

Nucleus Name	**DS_PSCAN_TestImageOn**
Nucleus Number	802
Description	Generate the test images that are present on the progressive scan IC.
User Input	In case of ADV7196: When no input is given “HATCH” is the default -“HATCH” -“FRAME” Remark: “HATCH” is a crosshatch test pattern (horizontal and vertical white lines are displayed against a black background) “FRAME” is a uniform coloured frame/field test pattern (default white). In case of FLI2300: Nothing.
Example	DS:> 802 HATCH 080200: Test OK @

Nucleus Name	**DS_PSCAN_TestImageOff**
Nucleus Number	803
Description	Switch off the generated test image
User Input	None
Example	DS:> 803 080300: Test OK @

Nucleus Name	**DS_PSCAN_TestImageColourSettingsSet**
Nucleus Number	804
Description	Set the colour of the hatch- or the frame- field to a different value than the default white
User Input	A colour string of one of the next non-case sensitive strings (WHITE, BLACK, RED, GREEN, BLUE, YELLOW, CYAN, MAGENTA) or Y Cr Cb (hexa-) decimal values.
Example	DS:> 804 yellow 080400: Test OK @ DS:> 804 0x6a 0xde 0xca 080400: Test OK @

Nucleus Name	**DS_PSCAN_TestImageColourSettingsGet**
Nucleus Number	805
Description	Get the colour settings of the hatch- or the frame- field.
User Input	None
Example	DS:> 805 080500: Colour Y Cr Cb values: 0xD2 0x92 0x10 Test OK @

Nucleus Name	**DS_PSCAN_Routing**
Nucleus Number	806
Description	Route a video signal from the host processor through the progressive scan ICs to the progressive scan output of the set. Note: to route the progressive scan to the output of the set, first call nucleus 1112 with parameter 0 (video routing on analogue board).
User Input	None
Example	DS:> 806 080600: Test OK @

Nucleus Name	**DS_PSCAN_DevTypeGetDeinterlacer**
Nucleus Number	807
Description	Get the device (revision) type information of the progressive scan deinterlacer.
User Input	None
Example	DS:> 807 080700: Chip name : 2300 Chip version : 1 Test OK @

Nucleus Name	**DS_PSCAN_CommunicationDeinterlacer**
Nucleus Number	808
Description	Check the communication between the IIC controller of the chrysalis and the progressive scan Deinterlacer-IC
User Input	None
Example	DS:> 808 080800: Test OK @

Basic Engine (BE)

Nucleus Name	**DS_BE_CommunicationEcho**
Nucleus Number	900
Description	Check the communication between the digital board and the basic engine by issuing an echo command over the S2B interface
User Input	None
Example	DS:> 900 090000: Test OK @

Nucleus Name	**DS_BE_Reset**
Nucleus Number	901
Description	Reset the basic engine
User Input	None
Example	DS:> 901 090100: Test OK @

Nucleus Name	**DS_BE_VersionGet**
Nucleus Number	903
Description	Get the version of the basic engine and that of the optical unit
User Input	None
Example	DS:> 903 090300: BE version = 20.09.18 Optical unit version = 3C.00.09.41.08 Test OK @

Nucleus Name	**DS_BE_GetSelftestResult**
Nucleus Number	902
Description	Return the self-test results through the service port
User Input	None
Example	DS:> 902 090200: Test OK @

Nucleus Name	**DS_BE_TrayOut**
Nucleus Number	904
Description	Open the tray of the basic engine
User Input	None
Example	DS:> 904 090400: Test OK @

Nucleus Name	**DS_BE_TrayIn**
Nucleus Number	905
Description	Close the tray of the basic engine

User Input	None
Example	DS:> 905 090500: Test OK @

Nucleus Name	**DS_BE_WriteReadDvdRw**
Nucleus Number	906
Description	Write data to and read data from a DVD+RW disc through the basic engine for verification of the writing
User Input	None
Example	DS:> 906 090600: Testing on sector 0x5dbe0: OK Test OK @

Nucleus Name	**DS_BE_WriteReadDvdR**
Nucleus Number	907
Description	Write data to and read data from a DVD+R disc through the basic engine for verification of the writing
User Input	None
Example	DS:> 907 090700: Testing on sector 0x36210: OK Test OK @

Nucleus Name	**DS_BE_StatisticalInformationGet**
Nucleus Number	908
Description	Retrieve the statistical information from the basic engine
User Input	None
Example	DS:> 908 Total time the power power on (HR:MIN) 0: 0h Total time of reading CDROM discs (HR:MIN) 0: 0h Total time of reading high DVD SL discs (HR:MIN) 0: 0h Total time of reading other DVD SL discs (HR:MIN) 0: 0h Total time of reading high DVD DL siscs (HR:MIN) 0: 0h Total time of reading other DVD DL discs (HR:MIN) 0: 0h Total time of reading high DVD+R discs (HR:MIN) 0: 0h Total time of reading other DVD+R discs (HR:MIN) 0: 0h Total time of reading high DVD+RW discs (HR:MIN) 0: 0h Total time of reading other DVD+RW discs (HR:MIN) 1: 0h Total time of writing DVD+R discs in 2HRS mode (HR:MIN) 0: 0h Total time of writing DVD+R discs in 4HRS mode (HR:MIN) 0: 0h Total time of writing DVD+R discs in 6HRS mode (HR:MIN) 0: 2h Total time of writing DVD+RW discs in 2HRS mode (HR:MIN) 0: 0h Total time of writing DVD+RW discs in 4HRS mode (HR:MIN) 0: 3h Total time of writing DVD+RW discs in 6HRS mode (HR:MIN) 0: 0h 090800: Test OK @

Nucleus Name	**DS_BE_StatisticalInformationReSet**
Nucleus Number	909
Description	Reset the statistical information in the basic engine
User Input	None
Example	DS:> 909 090900: Test OK @

Nucleus Name	**DS_BE_ErrorLogGet**
Nucleus Number	910
Description	Get the error log from the basic engine
User Input	None
Example	DS:> 910 Momentary errors (0-9): 0x21 0x00 0x00 0x20 0x00 0x00 0x00 0x00 0x00 0x00 Cumulative errors (1-9): 0x00 0x80 0x20 0x00 0x00 0x00 0x00 0x00 0x00Software fatal assert : 256 cpowermanager.cpp 091000: Test OK @

Nucleus Name	**DS_BE_ErrorLogReset**
Nucleus Number	911
Description	Reset the error log in the basic engine
User Input	None
Example	DS:> 911 091100: Test OK @

Nucleus Name	**DS_BE_JitterOptimise**
Nucleus Number	912
Description	Perform jitter optimisation: A formatted DVD must be loaded into the engine before executing this nucleus
User Input	none
Example	DS:> 912 Test OK @

Nucleus Name	**DS_BE_FocusOn**
Nucleus Number	913
Description	Put the laser of the BE into focus
User Input	None
Example	DS:> 913 091300: Test OK @

Nucleus Name	**DS_BE_FocusOff**
Nucleus Number	914
Description	Turn off putting the laser of the BE into focus
User Input	None
Example	DS:> 914 091400: Test OK @

Nucleus Name	**DS_BE_MotorOn**
Nucleus Number	915
Description	Turn on the turntable motor
User Input	None
Example	DS:> 915 091500: Test OK @

Nucleus Name	**DS_BE_MotorOff**
Nucleus Number	916
Description	Turn off the turntable motor
User Input	None
Example	DS:> 916 091600: Test OK @

Nucleus Name	**DS_BE_RadialOn**
Nucleus Number	917
Description	Close the radial loop
User Input	A formatted DVD must be loaded into the engine before executing this nucleus
Example	DS:> 917 091700: Test OK @

Nucleus Name	**DS_BE_RadialOff**
Nucleus Number	918
Description	Open the radial loop
User Input	None
Example	DS:> 918 091800: Test OK @

Nucleus Name	**DS_BE_RadialCalibration**
Nucleus Number	919
Description	Calibrate the radial loop
User Input	A formatted DVD must be loaded into the engine before executing this nucleus
Example	DS:> 919 091900: Test OK @

Nucleus Name	**DS_BE_Tilt**
Nucleus Number	920
Description	Test the tilt mechanism control loop, or allow its proper functioning to be measured. Before executing this nucleus a disc must be loaded into the recorder
User Input	None
Example	DS:> 920 092000: Tilt sensor bathtub: (71,-12,145)(68,-12,135)(62,-10,120)(56,-92,97)(50,-75,86) (44,-59,80)(41,-52,80)(35,-37,86)(29,-22,86) (23,-7,92)(17,8,111)(11,23,135)(8,31,138)(5,39,158) Test OK @

Nucleus Name	**DS_BE_CheckDisc**
Nucleus Number	921
Description	Check whether there is a disc inside the BE
User Input	None
Example	DS:> 921 092100: A DVD+Rewritable is loaded (disc is empty or partially recorded) Test OK @ DS:> 921 092100: No Disc is loaded Test OK @

Nucleus Name	**DS_BE_SledgeMotor**
Nucleus Number	922
Description	Send the sledge to its home position, then to the middle of the disc, and then to the end.
User Input	None
Example	DS:> 922 092200: Test OK @

Nucleus Name	**DS_BE_ReadTocInfo**
Nucleus Number	924
Description	Read the TOC from the disc. This gives a good indication if the BE works properly..
User Input	None
Example	DS:> 924 092400: TOC info [hex] = 91 3A 0C Test OK@ DS:> 924 092403: The BE returned: 0x10 #{no_disc_error} No disc is detected Error@ DS:> 924 092403: The BE returned: 0x1e #{illegal_medium_error} Engine unable to handle current disc. Probably illegal medium. Error @

Nucleus Name	**DS_BE_DiscErase**
Nucleus Number	925
Description	Perform a DC-erase on a DVD+RW disc.
User Input	None

Example	DS:> 925 The entirely disc will be erased. Are you sure you want this?[y/n] 092500: Test OK @

Nucleus Name	**DS_BE_RegionCodeSet**
Nucleus Number	928
Description	Set the region code in the AV3.
User Input	Region code
Example	DS:> 928 1 092800: Test OK @ DS:> 928 This nucleus is not supported by the engine 092800: Test OK @

Nucleus Name	**DS_BE_RegionCodeGet**
Nucleus Number	929
Description	Read the region code from the AV3.
User Input	None
Example	DS:> 929 092900: DVD region 1 Test OK @ DS:> 929This nucleus is not supported by the engine 092900: Test OK @

Nucleus Name	**DS_BE_RegionCounterReset**
Nucleus Number	930
Description	Reset the region counter in the AV3.
User Input	None
Example	DS:> 930 093000: Test OK @ DS:> 930 This nucleus is not supported by the engine 093000: Test OK @

Display and Control Board (DCB)

Nucleus Name	**DS_DCB_CommunicationEcho**
Nucleus Number	1000
Description	Check the communication between the digital board and the DCB by issuing an echo command
User Input	None
Example	DS:> 1000 100000: Test OK @

Nucleus Name	**DS_DCB_VersionGet**
Nucleus Number	1001
Description	Get the version of the DCB
User Input	None
Example	DS:> 1001 100100: DCB version: 13 Test OK @

Nucleus Name	**DS_DCB_LightDisplay**
Nucleus Number	1002
Description	Light the entire display of the DCB, and clear the display after confirmation. User confirmation is necessary.
User Input	None

Example	DS:> 1002 100200: Test OK @

Nucleus Name	**DS_DCB_Keyboard**	
Nucleus Number	1004	
Description	Check all keys of the keyboard by confirming the key-code displayed of each key.	
User Input	None	
Example	DS:> 1004 100400: Test OK @	

Nucleus Name	**DS_DCB_RemoteControl**
Nucleus Number	1005
Description	Check the interface between the remote control and the DCB by checking the key-code displayed
User Input	None
Example	DS:> 1005 100500: Test OK @

Nucleus Name	**DS_DCB_Led**	
Nucleus Number	1006	
Description	Switch the record LED on, and after confirmation off. The user confirms by pressing the REC key, STOP key, or the PLAY key on the local keyboard. The PLAY key confirms that the LED is on and the REC key	
User Input	None	
Example	DS:> 1006 100600: Test OK @	

Analogue Board (ANAB)

Nucleus Name	**DS_ANAB_CommunicationEcho**
Nucleus Number	1100
Description	Check the communication between the digital board and the analogue board by issuing some echo string.
User Input	None
Example	DS:> 1100 110000: Hello Analogue Board Test OK @

Nucleus Name	**DS_ANAB_CommunicationIicNvram**
Nucleus Number	1101
Description	Check the communication between the digital board and the NVRAM on the analogue board.
User Input	None
Example	DS:> 1101 110100: Test OK @

Nucleus Name	**DS_ANAB_CommunicationIicTuner**
Nucleus Number	1102
Description	Check the communication between the digital board and the tuner on the analogue board
User Input	None
Example	DS:> 1102 110200: Test OK @

Nucleus Name	**DS_ANAB_CommunicationIicDataSlicer**
Nucleus Number	1103
Description	Check the communication between the digital board and the data slicer on the analogue board
User Input	None

Example	DS:> 1103 110300: Test OK @

Nucleus Name	**DS_ANAB_CommunicationIicSoundProcessor**
Nucleus Number	1104
Description	Check the communication between the digital board and the sound processor on the analogue board
User Input	None
Example	DS:> 1104 110400: Test OK @

Nucleus Name	**DS_ANAB_CommunicationIicAVSelector**
Nucleus Number	1105
Description	Check the communication between the digital board and the A/V-selector on the analogue board
User Input	None
Example	DS:> 1105 110500: Test OK @

Nucleus Name	**DS_ANAB_HardwareVersionGet**
Nucleus Number	1106
Description	Get the hardware version of the analogue board
User Input	None
Example	DS:> 1106 110600: Analogue hardware version : 11 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionBootGet**
Nucleus Number	1107
Description	Get the software version of the boot software of the analogue board
User Input	None
Example	DS:> 1107 110700: Bootcode application version : 11.00.11 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionDownloadGet**
Nucleus Number	1108
Description	Get the software version of the download software of the analogue board
User Input	None
Example	DS:> 1108 110800: Download application version : 11.00.06 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionApplGet**
Nucleus Number	1109
Description	Get the software version of the application software of the analogue board
User Input	None
Example	DS:> 1109 110900: Recorder application version : 11.00.23 Test OK @

Nucleus Name	**DS_ANAB_SoftwareVersionDiagnosticsGet**
Nucleus Number	1110
Description	Get the software version of the diagnostic software of the analogue board
User Input	None
Example	DS:> 1110 111000: Diagnostics application version : 11.00.13 Test OK @

Nucleus Name	**DS_ANAB_ChecksumProgram**
Nucleus Number	1111

Description	Check the checksum of the several partitions by recalculating and comparing partition checksums
User Input	None
Example	DS:> 1111 BootCode checksum is: 0xBABE6240, which is correct Diagnostics checksum is : 0xBABEBEAD, which is correct Download checksum is: 0xBABEA6B7, which is correct Application checksum is : 0xBABEB277, which is correct 111100: Test OK @

Nucleus Name	**DS_ANAB_VideoRouting**
Nucleus Number	1112
Description	Perform the routing of the video paths on the analogue board
User Input	The user has to input the correct parameter for the routing (see table 'video routing' below).
Example	DS:> 1112 00 111200: Test OK @

Video routing paths (Europe)

Path ID	Description
0	Input signal is VIDEO(CVBS) from digital board and will be re-routed back to the digital board.
1	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.
2	No Routing.
3	Input signal is from FRONT S-VIDEO(Y/C) and will be routed to the digital board.
4	No Routing.
5	Input signal is CVBS from SCART1 and will be routed to the digital board.
6	Input signal is CVBS from SCART2 and will be routed to the digital board.
7	Input Signal is CVBS from Digital Board and it will be routed to Scart1 and Scart2.
8	Input signal is VIDEO(CVBS) from ANTENNA IN and will be routed to SCART2.
9	Input signal is VIDEO(CVBS) from SCART1 and will be routed to SCART2.
10	Input signal is VIDEO(CVBS) from SCART2 and will be routed to SCART1.
11	Signal path is routed Fast Blank from Scart2 pin16 and will be routed SCART1 pin16
12	Input Signal is YC from Digital Board and it will be routed to SCART1.
13	
14	No Routing.
15	Input Signal is CVBS from TUNER and it will be routed to Digital .
16	No Routing.
17	Input Signal is routed from digital board YC to REAR S-VIDEO(YC) OUT
18	Signal path is routed from digital board RGB to RGB SCART1 and from digital board CVBS to digital board CVBS.
19	No Routing.
20	Input RGB Signal is routed from Digital Board to SCART1(RGB),Input CVBS Signal from Digital Board to Digital Board and Fast Blanking Signal from SCART2 to SCART1.
21	Input Y/C Signal from Digital Board is routed to Rear Y/C Connector and Input Y/C Signal from Front Y/C connector is routed to Digital Board.

Video routing paths (NAFTA)

Path ID	Description
0	No Routing.
1	Input signal is from FRONT VIDEO(CVBS) IN and will be routed to the digital board.This routing is same as the above path id.
2	Input signal is from REAR VIDEO(CVBS) IN and will be routed to the digital board.
3	Input signal is from FRONT S-VIDEO(Y/C) IN and the signal received will be routed to the digital board.
4	Input signal is from REAR S-VIDEO(Y/C) IN and will be routed to the digital board.
5	No Routing.
6	No routing.
7	No routing.
8	Input signal is VIDEO(CVBS) from TUNER and will be routed to Y Pin of Rear Y/C Connector.This will give only black/White Picture .
9	Input signal is from YUV IN and will be routed to YUV OUT.This is possible only if Digital Board routes back YUV signal received back to the Analogue board(DENC)

10	No routing.
11	No routing.
12	No Routing.
13	No Routing.
14	No Routing.
15	Input CVBS Signal from Tuner is routed to Digital Board..
16	No Routing.
17	No Routing.
18	Input Signal from CVBS Rear In is routed to Digital Board. This is the same as path ID 02.
19	Input Y/C signal from Digital Board is routed to Y/C Rear Out Connector and Input signal from Y/C Front In Connector is routed to Y/C Digital Board.
20	Y/C signal from Digital Board is routed to Y/C Rear Out Connector and Input signal from Y/C Rear In Connector is routed to Y/C Digital Board.
23	The Video signal received from the Digital board will be output on Modulator channel 3.
24	The Video signal received from the Digital board will be output on Modulator channel 4.

Nucleus Name	**DS_ANAB_AudioRouting**
Nucleus Number	1113
Description	Perform the routing of the audio paths on the analogue board
User Input	The user has to input the correct parameter for the routing (see table 'audio routing' below)
Example	DS:> 1113 00 111300: Test OK @

Audio routing paths (Europe)

Path ID	Description
0	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
1	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
2	No Routing.
3	Input signal is AUDIO from SCART1 and will be routed to the digital board.
4	Input signal is AUDIO from SCART2 and will be routed to the digital board.
5	No routing.
6	No routing.
7	Input Audio signal is from the digital Board and it will be routed to the SCART1 and SCART2
8	Input AUDIO signal from TUNER and will be routed to SCART2.
9	Input signal is AUDIO from SCART1 and will be routed to SCART2.
10	Input audio signal from SCART2 is routed to SCART1.
11	Input Audio signal is routed from DVIO to SCART2.
12	
13	No Routing.
14	Input is Audio Signal from DVIO and it will be routed to Digital Board.
15	Input is Audio Signal from TUNER and it will be routed to Digital Board..
16	No routing.
17	No Routing.
18	Input signal is from FRONT AUDIO IN and will be routed to SCART2.
21	Input signal is from FRONT AUDIO IN and will be routed to the digital board.

Audio routing paths (NAFTA)

Path ID	Description
0	No Routing.
1	Input signal is from FRONT AUDIO IN and will be routed to the digital board.
2	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.
3	Input Audio Signal is routed from FRONT Cinch In to Digital Board.(This is same as path ID 01)
4	Input Signal is from Rear Cinch In1 and it will be routed to Digital Board..
5	No routing.
6	No routing.
7	No routing.
8	No Routing.
9	No routing.
10	No Routing.
11	No Routing.
12	No Routing.

13	Input Signal is from Digital Board and it will be routed to the digital board.
14	No routing.
15	Input is Audio Signal from TUNER and it will be routed to Digital Board.
16	Input signal is AUDIO from dvio board and will be routed to Digital Board.
17	No routing.
18	No routing.
19	No routing.
20	Input signal is from REAR AUDIO IN 2 and will be routed to the digital board.
21	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
22	Input signal is from REAR AUDIO IN 1 and will be routed to the digital board.
23	The Audio signal received from the Digital board will be outputted on Modulator channel 3.
24	The Audio signal received from the Digital board will be outputted on Modulator channel 4.

<table>
<tr><td>Nucleus Name</td><td colspan="3">**DS_ANAB_SelectTunerChannel**</td></tr>
<tr><td>Nucleus Number</td><td colspan="3">1114</td></tr>
<tr><td>Description</td><td colspan="3">Set the tuner to receive a valid audio and video signal</td></tr>
<tr><td rowspan="9">User Input</td><td colspan="3"><Frequency*16> <video standard id>
Tuner frequency: to tune the tuner to e.g. 216 MHz, this parameter must be 3456. (Since 216*16 = 3456. This is to avoid the decimal points to the parameter list.)
Video standard id: The table below shows which video standards are possible</td></tr>
<tr><td>Video standard id</td><td>Europe</td><td>NAFTA</td></tr>
<tr><td>16</td><td>PAL_BG</td><td>NTSC</td></tr>
<tr><td>32</td><td>PAL_I</td><td>Invalid</td></tr>
<tr><td>48</td><td>PAL_DK</td><td>Invalid</td></tr>
<tr><td>64</td><td>SEC_L</td><td>Invalid</td></tr>
<tr><td>80</td><td>SEC_LS</td><td>Invalid</td></tr>
<tr><td>96</td><td>SEC_BG</td><td>Invalid</td></tr>
<tr><td>112</td><td>SEC_DK</td><td>Invalid</td></tr>
<tr><td>Example</td><td colspan="3">DS:> 1114 3456 16
111400:
Test OK @</td></tr>
</table>

Nucleus Name	**DS_ANAB_IICWriteRead**
Nucleus Number	1115
Description	Perform an IIC write and read action on the analogue board
User Input	Writing: [<W>|<w>] [I2C address] [number of data bytes to write] with <data[0]...data[n]> Max 16 data bytes (n < 16). Reading: [<R>|<r>] [I2C address] [number of data bytes to read] Max 16 data bytes (n < 16).
Example	DS:> 1115 w 0x94 2 0x06 0x02 111500: Test OK @

Nucleus Name	**DS_ANAB_ClockAdjust**
Nucleus Number	1116
Description	Set the clock to the value passed through in the YYYY MM DD HH MM SS format
User Input	<YYYY> <MM> <DD> <HH> <MM> <SS>
Example	DS:> 1116 2002 11 11 11 11 11 111600: Test OK @

Nucleus Name	**DS_ANAB_ClockReference**
Nucleus Number	1117
Description	Generate a 1 kHz signal on pin 7 (INT) of the clock IC
User Input	None
Example	DS:> 1117 111700: Test OK @

Nucleus Name	**DS_ANAB_ClockCorrection**
Nucleus Number	1118

Description	Store the clock IC correction value in NVRAM
User Input	The correction value for the clock
Example	DS:> 1118 1000023 111800: Test OK @

Nucleus Name	**DS_ANAB_TunerAFCReferenceVoltage**
Nucleus Number	1119
Description	Store the reference voltage for the tuner in NVRAM
User Input	The reference voltage, between 0 and 255
Example	DS:> 1119 5 111900: Test OK @

Nucleus Name	**DS_ANAB_TunerFrequencyDownload**
Nucleus Number	1120
Description	Store the frequency table in NVRAM. The frequency table is passed through the error-string provided to the nucleus.
User Input	See frequency table
Example	DS:> 1120 2233 00 02 4E45442031 112000: Test OK @

Nucleus Name	**DS_ANAB_StoreExternalPresets**
Nucleus Number	1121
Description	Store the external presets in NVRAM
User Input	None
Example	DS:> 1121 112100: Test OK @

Nucleus Name	**DS_ANAB_BargraphLevelAdjust**
Nucleus Number	1122
Description	Measure the audio signal corresponding to 0dB per channel and store it as correction value in NVRAM
User Input	none
Example	DS:> 1122 112200: Test OK @

Frequency download string format

Format	description	remarks
X(XXX)	Preset number	
VVWW	VV: Channel number WW : Channel offset	
ZZ	Byte containing 8 bit fields for TRUE/FALSE : BIT 0: Decoder BIT 1: Modulation BIT 2: NICAM SAP BIT 3: Satpreset BIT 4: Presetdefined Channelpreferred BIT 5: ExtPreset BIT 6: NameManuallyChanged BIT 7: ChannelPreset	NICAM/stereo bit for Europe SAP/stereo bit for NAFTA Preset defined bit is only used for Europe. For NAFTA, it is renamed as channelpreferred to indicate if a channel is preferred or not. TRUE if preset is defined from P50 as extern [TGA]
HH	HfSystemFineTuning	HfS: 4 bit, FT: -4,...,4
IIJJKKLLMM	Netname	Range: A,..,Z,0,..,9,_,.. Netname length exists for Europe only. ‘II’ is the HEX-value for the first character, ‘JJ’ for the second, Ö

The message string of (DS_MessageDef *msgString) should be in the format:
“X(XXX)_VVWW_ZZ_HH_IIJJKKLLMM”.
Here will be ‘X(XXX)’ a decimal value in the range of 0 to 255.
V, W, Z, H, I, J, K, L, M are hex values with out the prefix ‘0x’ (in the range 0... 9,A ... F)
“ _” Denotes a space character.

Remarks:
CHANNEL_SYSTEM is for NAFTA.
PRESET_SYSTEM is for Europe.

System (SYS)

Nucleus Name	**DS_SYS_HardwareVersionGet**	
Nucleus Number	1200	
Description	Get the hardware version and type of the digital board	
User Input	None	
Example	DS:> 1200 120000: Hardware ID = 00 The (PIO-pins) Digital Board ID = 2 Test OK @ DS:>	

Nucleus Name	**DS_SYS_SoftwareVersionBootGet**
Nucleus Number	1201
Description	Get the version of the boot software on the digital board
User Input	None
Example	DS:> 1201 120100: Software Boot Version = 0001 Test OK @

Nucleus Name	**DS_SYS_SoftwareVersionDownloadGet**
Nucleus Number	1202
Description	Get the version of the download software on the digital board
User Input	None
Example	DS:> 1202 120200: Software Download Version = 0001 Test OK @

Nucleus Name	**DS_SYS_SoftwareVersionApplGet**
Nucleus Number	1203
Description	Get the version of the application software on the digital board
User Input	None
Example	DS:> 1203 120300: Software Application Version = 0001 Test OK @

Nucleus Name	**DS_SYS_SoftwareVersionDiagnosticsGet**	
Nucleus Number	1204	
Description	Get the version of the diagnostics software on the digital board	
User Input	None	
Example	DS:> 1204 120400: Software Diagnostics Version = 0001 Test OK @	
	120503	Something went wrong while transferring the data.
	120504	User cancelled the upload.
Example	DS:> 1205 1 120500: Test OK @	

Nucleus Name	**DS_SYS_EepromUpload**
Nucleus Number	1205
Description	Upload the contents of the NVRAM on the analogue board or the digital board to the service PC, by using the X-modem protocol

User Input	Choose one of the following parameters for the nucleus: 1. Upload the contents of the NVRAM of the digital board 2. Upload the contents of the NVRAM of the analogue board Choose in the terminal on the control PC -> transfer -> receive file. Select X-modem protocol. Then click receive in the dialogue and fill in the file name in which you want to store the data.

Nucleus Name	**DS_SYS_EepromDownload**
Nucleus Number	1206
Description	Download a file with the contents of the NVRAM for the analogue board or the digital board from the service PC to the recorder, by using the X-modem protocol
User Input	Choose one of the following parameters for the nucleus: 1. Download the contents of the NVRAM of the digital board 2. Download the contents of the NVRAM of the analogue board Choose in the terminal of the control PC -> transfer -> send file. Select X-modem protocol. Then choose a file with the Browse button in the dialogue and click on send.
Example	DS:> 1206 1 120600: Test OK @

Nucleus Name	**DS_SYS_DvIdNumberSet**
Nucleus Number	1207
Description	Set the IEEE 1394 unique ID The unique ID to be set.
User Input	None
Example	DS:> 1207 1234567890 120700: Test OK @

Nucleus Name	**DS_SYS_DvIdNumberGet**
Nucleus Number	1208
Description	Get the IEEE1394 ID
User Input	None
Example	DS:> 1208 120800: The DvIdNumber is: 0x0C22384E5A Test OK @

Nucleus Name	**DS_SYS_IicWrite**
Nucleus Number	1209
Description	Perform an IIC write action on the digital board
User Input	The user input the number of bytes to write followed by these bytes: <BusID><Slave address to write to><number of bytes to write><d1><d2><..><dx> Where the bus ID is either 0 (normally used) or 1
Example	DS:> 1209 0 0xa0 1 0x6 120900: 1 Bytes written Test OK @

Nucleus Name	**DS_SYS_IicRead**
Nucleus Number	1210
Description	Perform an IIC read action on the digital board
User Input	The user inputs the number of bytes to read and the address to read them from: <BusID><Slave address to read from><Number of bytes to read> Where the bus ID is either 0 (normally used) or 1
Example	DS:> 1210 0 0xa0 1 121000: Value read =0x06 Test OK @

Nucleus Name	**DS_SYS_UartWrite**
Nucleus Number	1211
Description	Perform an UART write action on the digital board on a specified UART

User Input	The user inputs the UART to write to, the number of bytes and the bytes to be written to the UART. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr><Number of bytes to write><d1><d2><..><dx>
Example	DS:> 1211 2 2 0xd1 0x01 121100: Test OK @

Nucleus Name	**DS_SYS_UartRead**
Nucleus Number	1212
Description	Perform an UART read action on the digital board on a specified UART
User Input	The user inputs the UART to read from. 1=UART port 1 : not used 2=UART port 2 : Bit Engine 3=UART port 3 : Analogue board <UartNr >
Example	DS:> 1212 2 121200: The value that was read is: 0x50 0xD1 0x00 Test OK @

Nucleus Name	**DS_SYS_VideoLoopThroughStart**
Nucleus Number	1213
Description	The video signal, which is confirm the user input, is routed from the input to the output. Input is set with the routing nucleus 1112. All outputs are enabled.
User Input	<vipInput> <VideoOutput> <VideoStandard> 1. vipInput (CVBS, YC, YUV, RGB). 2. VideoOutput (YUV, RGB). 3. VideoStandard (PAL, NTSC).
Example	DS:> 1213 CVBS RGB PAL 121300: Test OK @

Nucleus Name	**DS_SYS_VideoLoopThroughStop**
Nucleus Number	1214
Description	Stop routing the video input to all the outputs.
User Input	-
Example	DS:> 1214 121400: Test OK @

Nucleus Name	**DS_SYS_VideoLoop**
Nucleus Number	1215
Description	Note: Before executing this nucleus the user must route the video signal on the analog board with nucleus DS_ANAB_VideoRouting(1112).
User Input	Video input of the digital board: - CVBS - YC - YUV - RGB - TEST (The video output will be routed to the video input on the digital board.) Video standard: - PAL - NTSC When no input is given, the nucleus will take TEST for video input and PAL for video standard.
Example	DS:> 1215 cvbs ntsc 121500: Test OK @ DS:> 1215 cvbs pal 121508: The VideoInputProcessor cannot detect a sync-signal. Error @ DS:> 1215 yuv ntsc 121511: Error in luminance signal(Y) Error in chrominance signal(U) Error in chrominance signal(V) Error @

Nucleus Name	**DS_SYS_AudioLoop**
Nucleus Number	1216
Description	The user first needs to select how the audio path must be routed on the analogue board (FRS_DS_ANAB_AUDIO_VIDEO_ROUTING) and/or digital board before calling this nucleus. The user also has to route the audio outputs back to the inputs by means of cables. In this nucleus the Chrysalis generates an audio sine signal with a specific signature and sends it to the output of the digital board (FRS_DS_CHR_SINE). The Chrysalis encodes the audio signal to MPEG I layer II and after this the signature of the signal will be checked.
User Input	None
Example	DS:> 1216 121600: Test OK @

Nucleus Name	**DS_SYS_SlashVersionSet**
Nucleus Number	1217
Description	Set the slash version of the system
User Input	The slash version
Example	DS:> 1217 82 121700: Test OK @

Nucleus Name	**DS_SYS_SlashVersionGet**
Nucleus Number	1218
Description	Get the slash version of the system
User Input	None
Example	DS:> 1218 121800: The slash version is: 82 Test OK @

Nucleus Name	**DS_SYS_Virginize**
Nucleus Number	1219
Description	(Re-) Virginize the recorder. User data in the NVRAM of the analogue board is cleared
Example	DS:> 1219 121900: Test OK @

Nucleus Name	**DS_SYS_VirginModeOn**
Nucleus Number	1220
Description	Turn on the virgin mode functionality (e.g. the auto channel search upon start-up)
User Input	None
Example	DS:> 1220 122000: Test OK @

Nucleus Name	**DS_SYS_VirginModeOff**
Nucleus Number	1221
Description	Turn off the virgin mode functionality (e.g. the auto channel search upon start-up)
User Input	None
Example	DS:> 1221 122100: Test OK @

Nucleus Name	**DS_SYS_DisplayFatalOn**
Nucleus Number	1223
Description	Turn on the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically
User Input	None
Example	DS:> 1223 122300: Test OK @

Nucleus Name	**DS_SYS_DisplayFatalOff**
Nucleus Number	1224
Description	Turn off the display-fatal functionality which displays debug-information on the display when encountering a fatal error condition from which could not be recovered automatically
User Input	None
Example	DS:> 1224 122400: Test OK @

Nucleus Name	**DS_SYS_DisplayFatalGet**
Nucleus Number	1225
Description	Get the display-fatal flag of the recorder
User Input	None
Example	DS:> 1225 122500: Test OK @

Nucleus Name	**DS_SYS_SettingsSet**
Nucleus Number	1226
Description	Programs the digital board settings into the boot EEPROM on the digital board.
User Input	A large hexadecimal value that represents the digital board settings obtained from the DbString.exe program or from a reference set.
Example	DS:> 1226 646961677473746201010200010101010101000020080000 122600: Test OK @

Nucleus Name	**DS_SYS_SettingsDisplay**
Nucleus Number	1228
Description	Show the settings that are programmed in the BROM on the digital board.
User Input	None.
Example	DS:> 1228 Settings ID: 6D7920626F617264000203000101010201010000020080000 Board name: my board Hardware ID: 0 Codec IC: PNX7100_MF2 Video Input Processor IC: SAA7118 Progressive Scan Deinterlacer IC: None Progressive Scan Denc IC: ADV7196 I-Link physical layer circuit IC: PDI1394P25 I-Link link layer circuit IC: PDI1394P40 Audio clock: Clock scheme 1 Bit engine connector: available IDE connector 1: available IDE connector 2: not available PCI connector: not available RAM size 32MByte ROM size (NOR FLASH bank 1) 8MByte ROM size (NOR FLASH bank 2) Not available ROM size (NAND FLASH) Not available Bit Engine: AV 2.0 122800: Test OK @

Nucleus Name	**DS_SYS_SettingsGet**
Nucleus Number	1229
Description	Get the digital board diversity settings string that is programmed in the BROM on the digital board.
User Input	None.
Example	DS:> 1229 122900: 6D7920626F617264000203000101010201010000020080000 Test OK @

Nucleus Name	**DS_SYS_AudioLoopThroughStart**
Nucleus Number	1230
Description	Description: The audio input is routed from the an input to all outputs. Input is set with the routing nucleus 1113. All outputs are enabled.

User Input	None.	
Example	DS:> 1230 123000: Test OK @	

Nucleus Name	**DS_SYS_AudioLoopThroughStop**
Nucleus Number	1231
Description	Stop routing the audio input to all the outputs
User Input	-
Example	DS:> 1231 123100: Test OK @

Electronic Program Guide Board (EPGB)

Nucleus Name	**DS_EPGB_VersionGet**
Nucleus Number	1300
Description	Returns the version of the EPG board.
User Input	None
Example	DS:> 1300 130000: Version : 6.1.9 Test OK @

PCMCIA INTERFACE (PCMCIA)

Nucleus Name	**DS_PCMCIA_Reset**
Nucleus Number	1400
Description	Reset the PCMCIA device by sending a reset command through IDE
Example	DS:> 1400 140000: Test OK @

Nucleus Name	**DS_PCMCIA_Inquiry**
Nucleus Number	1401
Description	Get the vendor- and product identification and the product revision level of the media in the slot.
Example	DS:> 1401 140100: Test OK @

Nucleus Name	**DS_PCMCIA_WriteRead**
Nucleus Number	1402
Description	Perform a Write Read test to a random sector on the inserted medium in the PCMCIA device and check if the data read is equal to the data written.
Example	DS:> 1402 140200: Test OK @

Nucleus Name	**DS_PCMCIA_Diagnostics**
Nucleus Number	1403
Description	Shall perform the internal diagnostic tests implemented by the media in the slot.
Example	DS:> 1403 140300: Test OK @

Script

Nucleus Name	**DS_IH_ScriptHandler**
Nucleus Number	Script
Description	

Included tests:	1. DS_ANAB_COMMUNICATIONECHO_NUC 2. DS_DCB_COMMUNICATIONECHO_NUC 3. DS_BROM_COMMUNICATION_NUC 4. DS_SYS_SETTINGSDISPLAY_NUC 5. DS_CHR_DEVTYPEGET_NUC 6. DS_CHR_INT_PIC_NUC 7. DS_CHR_DMA_NUC 8. DS_BROM_WRITEREAD_NUC 9. DS_NVRAM_COMMUNICATION_NUC 10. DS_NVRAM_WRITEREAD_NUC 11. DS_SDRAM_WRITEREADFAST_NUC 12. DS_FLASH_WRITEREAD_NUC 13. DS_FLASH_CHECKSUMPROGRAM_NUC 14. DS_SYS_HARDWAREVERSIONGET_NUC 15. DS_VIP_DEVTYPEGET_NUC 16. DS_VIP_COMMUNICATION_NUC 17. DS_DVIO_LINKDEVTYPEGET_NUC 18. DS_DVIO_PHYDEVTYPEGET_NUC 19. DS_DVIO_LINKCOMMUNICATION_NUC 20. DS_DVIO_PHYCOMMUNICATION_NUC 21. DS_PSCAN_COMMUNICATIONDENC_NUC 22. DS_PSCAN_COMMUNICATIONDEINTERLACER_NUC 23. DS_BE_COMMUNICATIONECHO_NUC 24. DS_ANAB_COMMUNICATIONIICNVRAM_NUC 25. DS_ANAB_COMMUNICATIONIICTUNER_NUC 26. DS_ANAB_COMMUNICATIONIICSOUNDPROCESSOR_NUC 27. DS_ANAB_COMMUNICATIONIICAVSELECTOR_NUC 28. DS_ANAB_CHECKSUMPROGRAM_NUC
User Input	None

Example

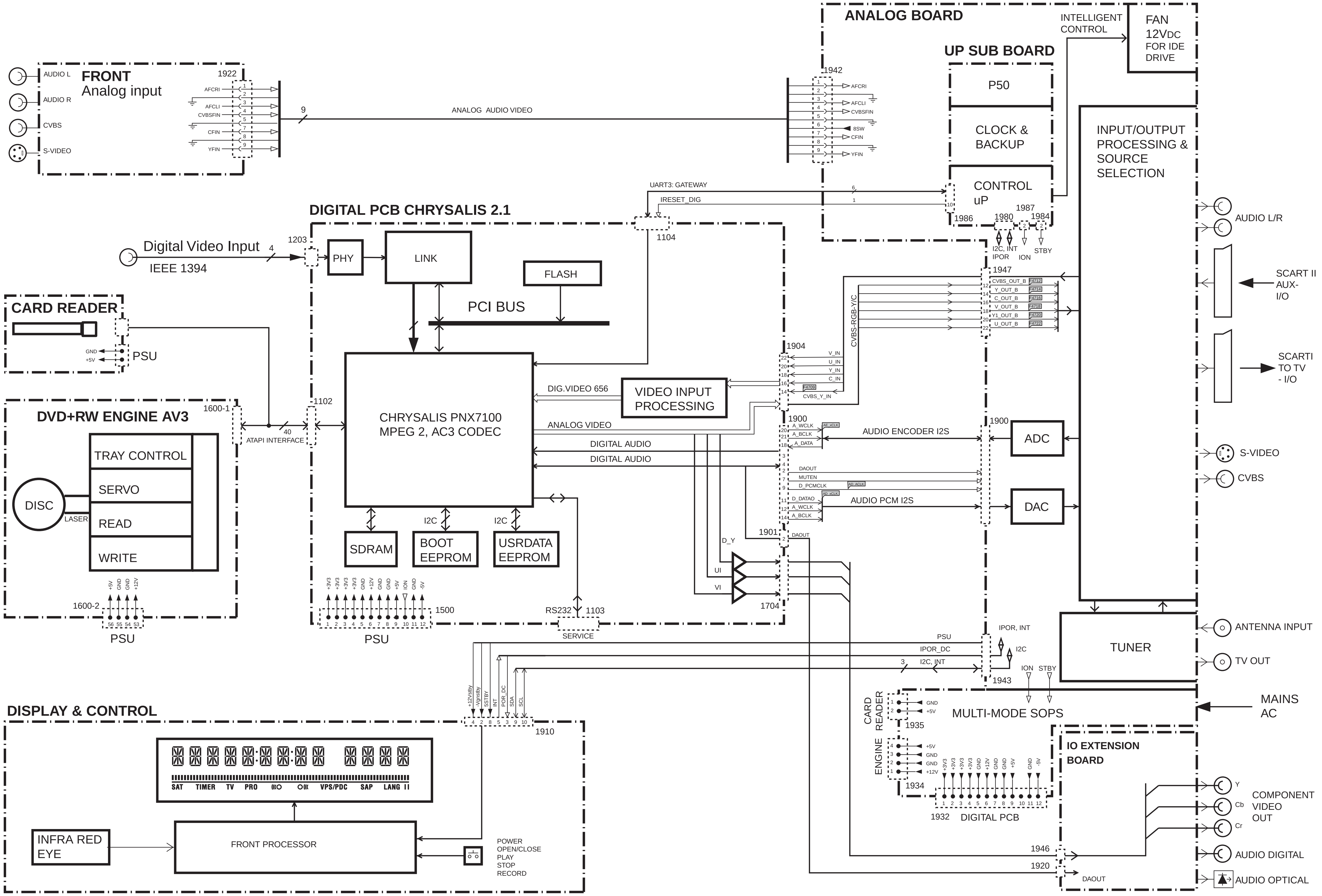
```
DS:> script
Executing User/Dealer script.
Busy executing NUC1100 1-28
Hello Analogue Board
Busy executing NUC1000 2-28
Busy executing NUC200 3-28
Busy executing NUC1228 4-28
Settings ID:  4C4541440D00000000030300010101020101000020080000
Board name:                       LEAD
Hardware ID:                      0
Codec IC:                         PNX7100_MF3
Video Input Processor IC:         SAA7118
Progressive Scan Deinterlacer IC:  None
Progressive Scan Denc IC:         ADV7196
I-Link physical layer circuit IC:  PDI1394P25
I-Link link layer circuit IC:     PDI1394P40
Audio clock:                      Clock scheme 1
Bit engine connector:             available
IDE connector 1:                  available
IDE connector 2:                  not available
PCI connector:                    not available
RAM size                          32MByte
ROM size (NOR FLASH bank 1)       8MByte
ROM size (NOR FLASH bank 2)       Not available
ROM size (NAND FLASH)             Not available
Bit Engine: AV 2.0
Busy executing NUC100 5-28
Device ID  7100
Codec ID   PNX7100_MF3
F-BCU  (0x0102) 1.0    INTC   (0x011d) 1.0    PCI-XIO(0x0113) 1.0
SIF    (0x013b) 1.0    EJTAG  (0x0104) 0.0    S-BCU  (0x0102) 1.0
BOOT   (0x010a) 1.0    CONFIG (0x013f) 1.0    RESET  (0x0123) 1.0
DEBUG  (0x0116) 0.0    UART0  (0x0107) 0.1    UART1  (0x0107) 0.1
UART2  (0x0107) 0.1    UART3  (0x0107) 0.1    I2C0   (0x0105) 0.1
I2C1   (0x0105) 0.1    GPIO   (0x013c) 1.0    SYNC   (0x013a) 1.0
DISP0  (0xa015) 0.2    DISP1  (0xa00f) 0.0    OSD    (0x0136) 0.1
SPU    (0xa00e) 0.0    MIXER  (0x0137) 1.0    DENC   (0x0138) 0.1
CCIR   (0x0139) 1.0    VDEC   (0x0133) 0.1    PARSER (0xa00d) 0.0
DV     (0xa00c) 0.0    BEI    (0xa00a) 0.0    IDE    (0xa009) 0.0
SGDX   (0xa008) 0.0    BYTE   (0xa00b) 0.0    OUTPUT (0xa003) 0.0
ACOMP  (0xa000) 0.0    VFE    (0xa001) 0.0    VCOMP  (0xa002) 0.0
SCR    (0x0000) 0.0    SIFF   (0xa011) 0.0    WMD    (0xa010) 0.0
AUDIO0 (0xa015) 0.2    AUDIO1 (0xa00f) 0.0    PSCAN  (0xa018) 0.0
Busy executing NUC114 6-28
Busy executing NUC115 7-28
Busy executing NUC201 8-28
Busy executing NUC300 9-28
Busy executing NUC301 10-28
Busy executing NUC401 11-28
Busy executing NUC501 12-28
Busy executing NUC503 13-28
BootCode    checksum is: 0xBABEB432, which is correct
Diagnostics checksum is: 0xBABED22B, which is correct
Download    checksum is: 0xBABE025F, which is correct
Application checksum is: 0xBABE2825, which is correct
Busy executing NUC1200 14-28
Hardware ID = 00
Busy executing NUC600 15-28
Found SAA7118
```

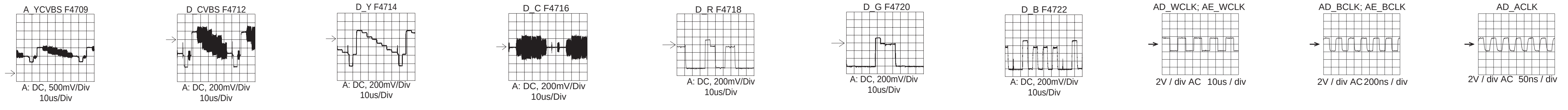
Example

```
Busy executing NUC601 16-28
Busy executing NUC700 17-28
Device type of the link layer IC: ffc00301
Busy executing NUC701 18-28
Device type of the phy layer IC: 0
Busy executing NUC702 19-28
Busy executing NUC703 20-28
Busy executing NUC801 21-28
Busy executing NUC808 22-28
The IIC acknowledge was not received, which is correct
Busy executing NUC900 23-28
Busy executing NUC1101 24-28
Busy executing NUC1102 25-28
Busy executing NUC1104 26-28
Busy executing NUC1105 27-28
Busy executing NUC1111 28-28
BootCode    checksum is: 0xBABE6240, which is correct
Diagnostics checksum is: 0xBABEDC9A, which is correct
Download    checksum is: 0xBABEA6B7, which is correct
Application checksum is: 0xBABE5968, which is correct
PASS
DS:>
```

6. Block Diagrams, Waveforms, Wiring Diagram.

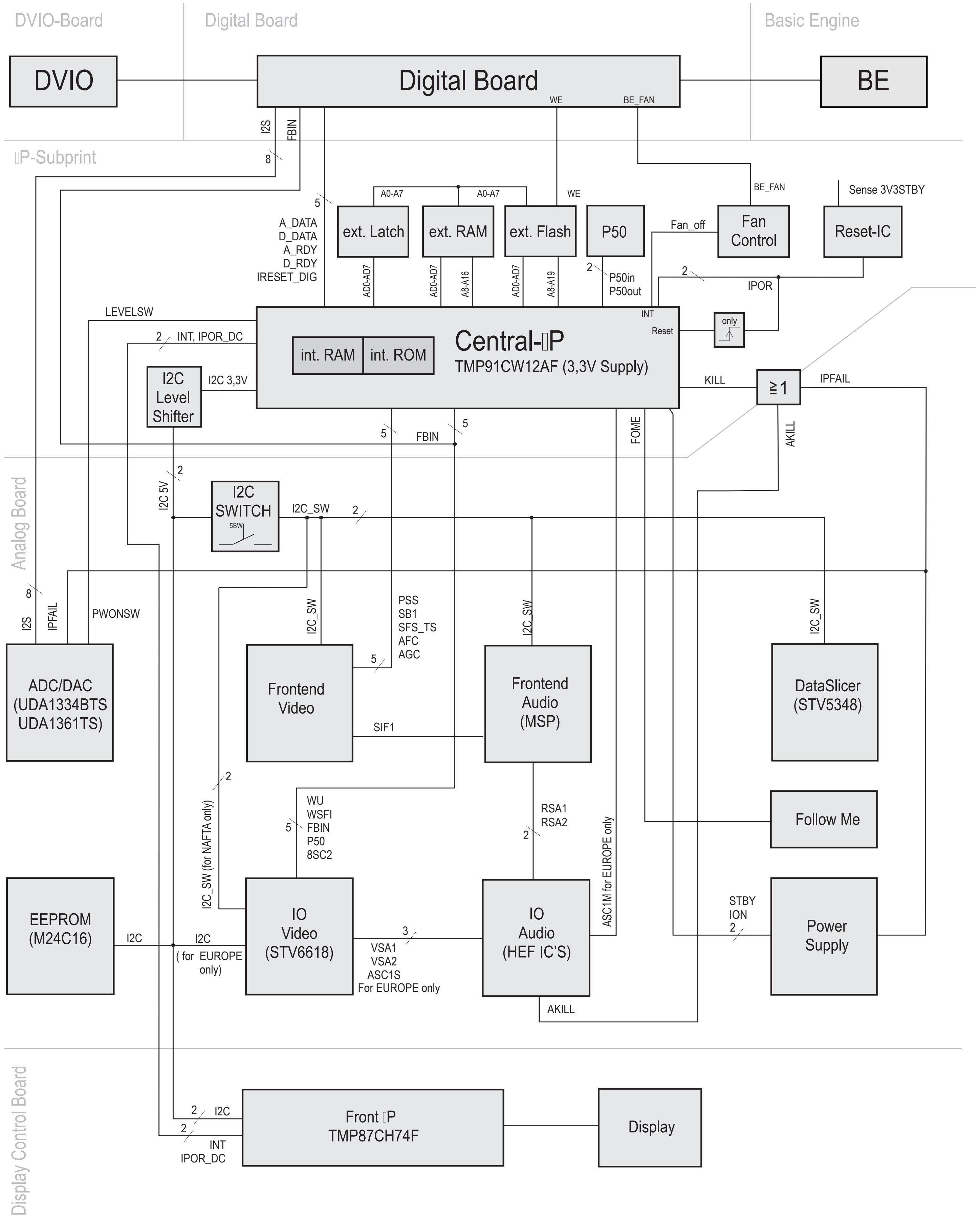
Overall Block Diagram Digital Board 2.1 Chrysalis





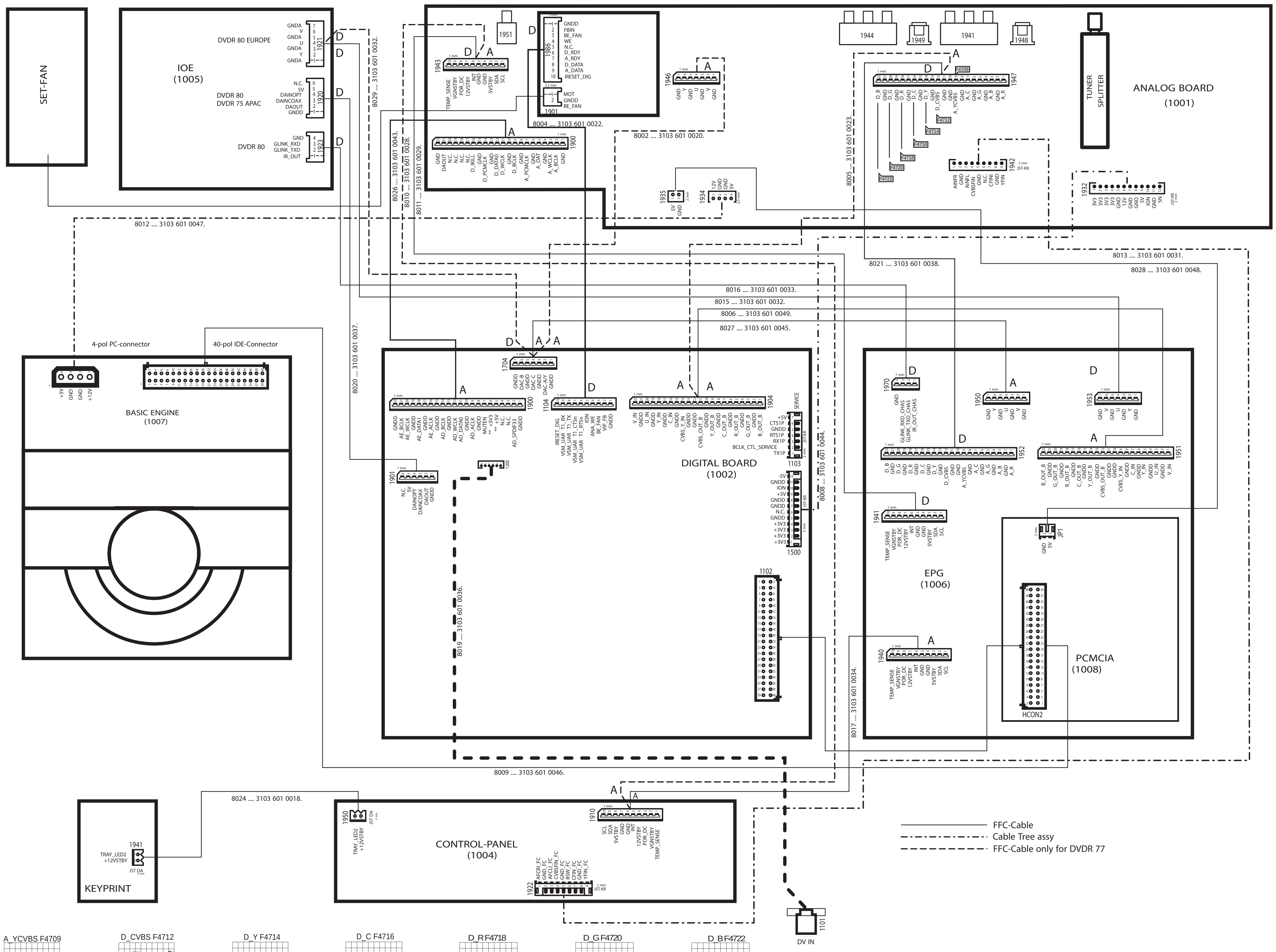
TR 1315_001
260803

Control Block Diagram Analog Board, uP Board

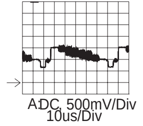


TR 01019_001
130502

Wiring Diagram

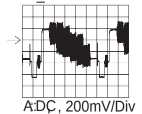


A_YCVBS F4709



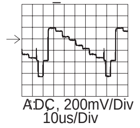
A:DC, 500mV/Div
10us/Div

D_CVBS F4712



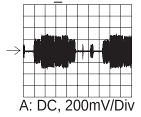
A:DC, 200mV/Div
10us/Div

D_Y F4714



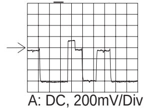
A:DC, 200mV/Div
10us/Div

D_C F4716



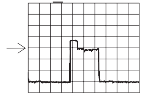
A: DC, 200mV/Div
10us/Div

D_R F4718



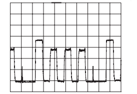
A: DC, 200mV/Div
10us/Div

D_G F4720



A: DC, 200mV/Div
10us/Div

D_B F4722



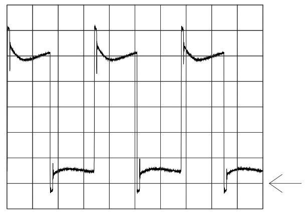
A: DC, 200mV/Div
10us/Div

TR 13001_001
200803

Waveforms

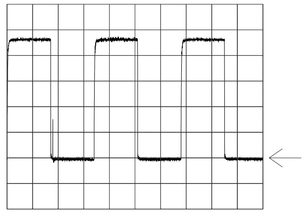
Waveforms Display Board

7106/7108-Emitter



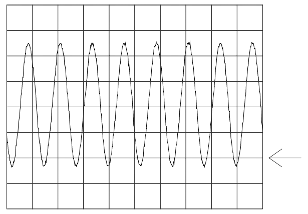
A: DC, 2 V/Div, 10us/Div

IC7103-19



A: DC, 1 V/Div, 10us/Div

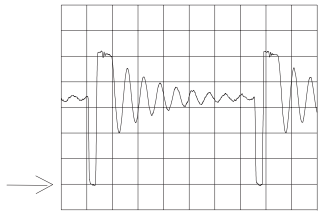
IC7103-8



A: DC, 1 V/Div, 100ns/Div

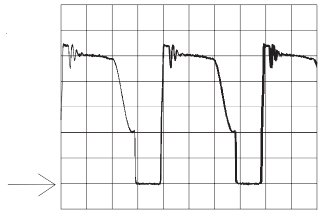
Waveforms Analog Board

F327 VDrain (Standby)



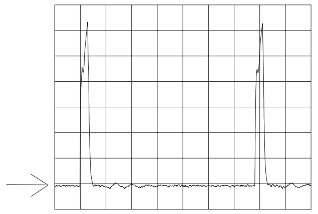
A: DC, 100V/Div
5us/Div

F327 VDrain (no disc loaded)



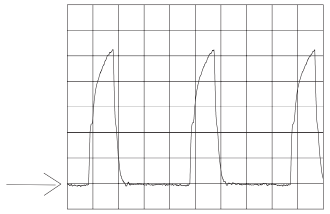
A: DC, 100V/Div
2us/Div

I324 VGate (Standby)



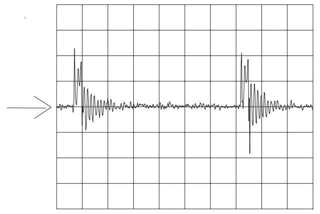
A: DC, 1V/Div
5us/Div

I324 VGate (no disc loaded)



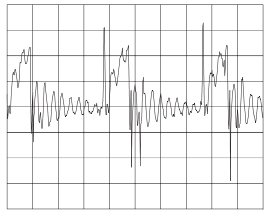
A: DC, 2V/Div
2us/Div

I324 VSource (Standby)



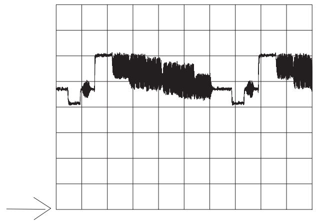
A: DC, 50mV/Div
5us/Div

I324 VSource (no disc loaded)



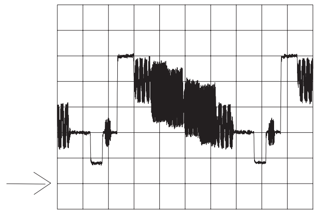
A: DC, 50mV/Div
2us/Div

F723 VFV I723



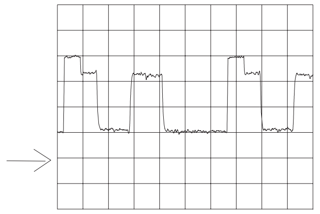
A: DC, 500mV/Div
10us/Div

E465



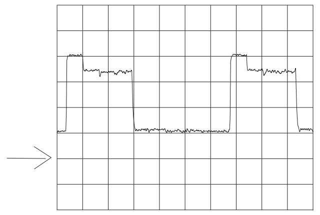
A: DC, 500mV/Div
10us/Div

E461



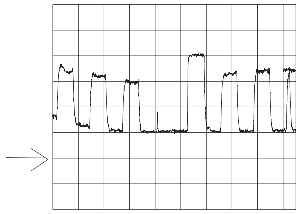
A: DC, 500mV/Div
10us/Div

E462



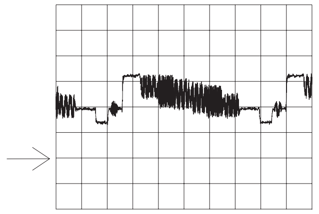
A: DC, 500mV/Div
10us/Div

E463



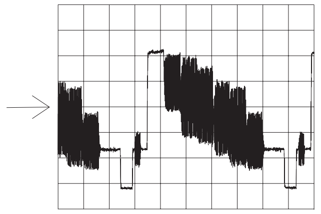
A: DC, 500mV/Div
10us/Div

A_CVBS I405



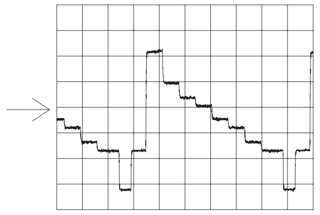
A: DC, 500mV/Div
10us/Div

D_CVBS F4712



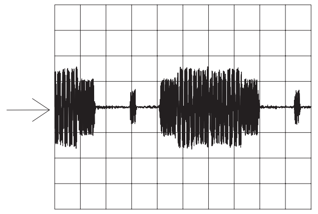
A: DC, 200mV/Div
10us/Div

D_Y F4714



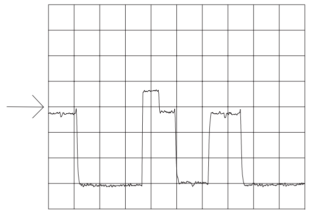
A: DC, 200mV/Div
10us/Div

D_C F4716



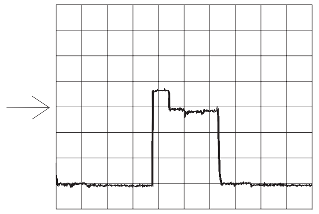
A: DC, 200mV/Div
10us/Div

D_R F4718



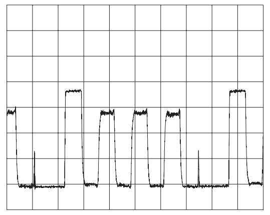
A: DC, 200mV/Div
10us/Div

D_G F4720



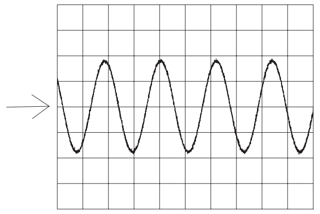
A: DC, 200mV/Div
10us/Div

D_B F4722



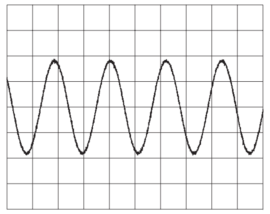
A: DC, 200mV/Div
10us/Div

I502/I504



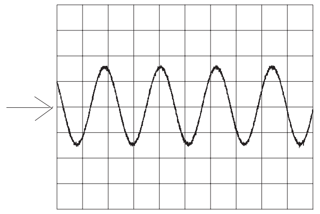
A: DC, 500mV/Div
500us/Div

I517/I518



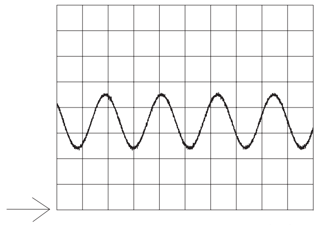
A: DC, 500mV/Div
500us/Div

F501/F502



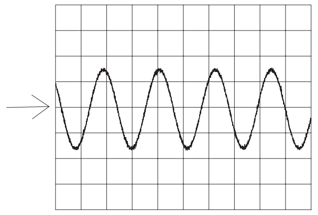
A: DC, 500mV/Div
500us/Div

I014/I032



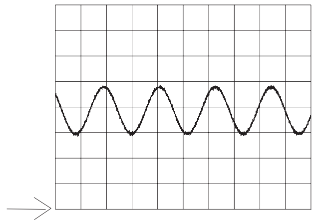
A: DC, 500mV/Div
500us/Div

ARDAC/ALDAC F010/F011



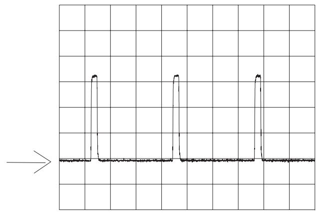
A: DC, 500mV/Div
500us/Div

I623



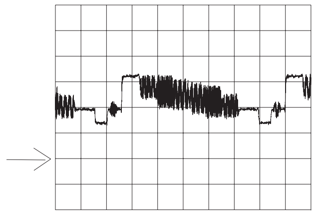
A: DC, 1 V/Div
500us/Div

SYNC F843



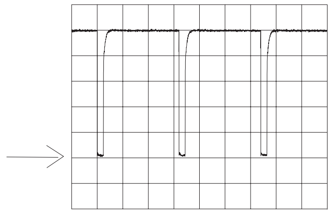
A: DC, 500mV/Div
10us/Div

A_CVBS F8008



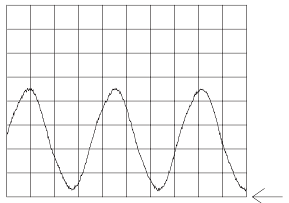
A: DC, 500mV/Div

I818



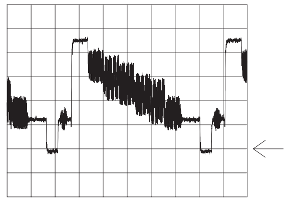
A: DC, 1 V/Div

I994



A: DC, 1 V/Div
20ns/Div

I989

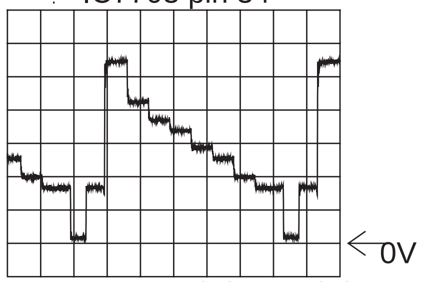


A: DC, 200mV/Div
10us/Div

TR 070018_001
200303

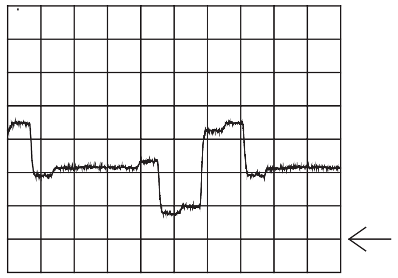
Waveforms Digital Board Chrysalis 2.1

IC7703 pin 34



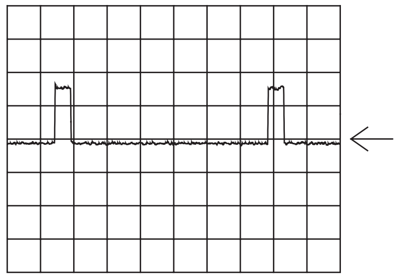
A: DC, 200mV/Div, 5us/Div

IC7703 pin 36



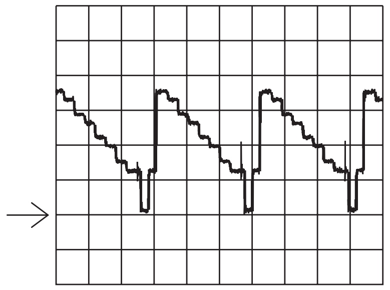
A: DC, 200mV/Div, 5us/Div

HS_IN



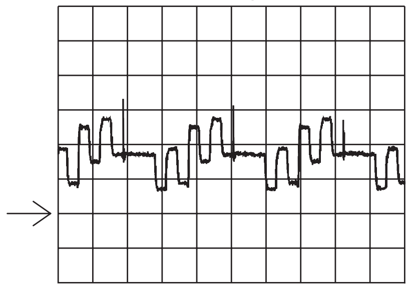
A: DC, 2 V/Div, 10us/Div

Y 1704-2



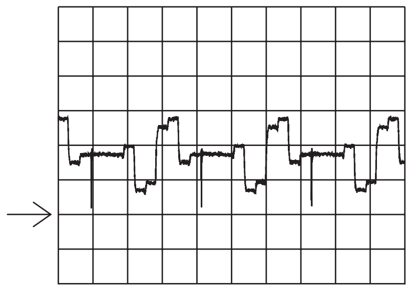
A: DC, 500mV/Div
10us/Div

PB 1704-4



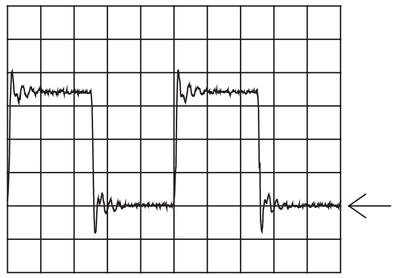
A: DC, 500mV/Div
10us/Div

PR 1704-6



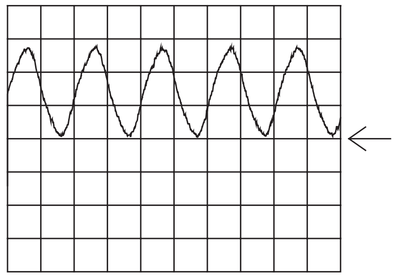
A: DC, 500mV/Div
10us/Div

IC7402 pin 3, F405



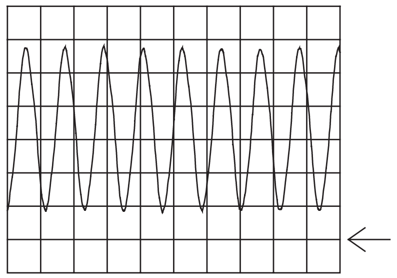
A: DC, 1 V/Div, 50ns/Div

IC7200 pin 60, F203



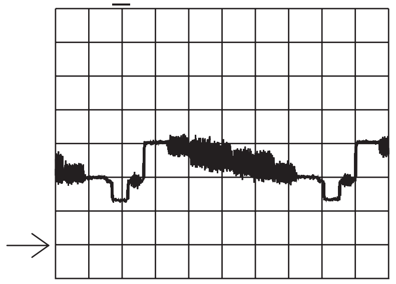
A: DC, 1 V/Div, 20ns/Div

X1001



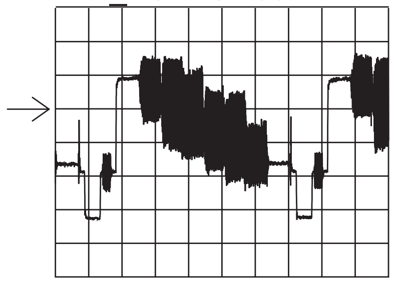
A: DC, 500mV/Div, 2us/Div

A_YCVBS 1904-14



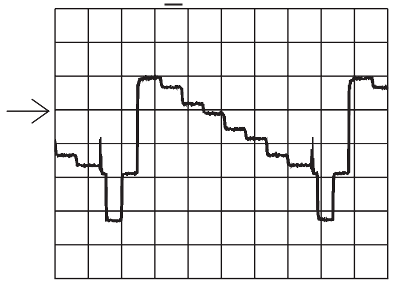
A: DC, 500mV/Div
10us/Div

D_YCVBS 1904-11



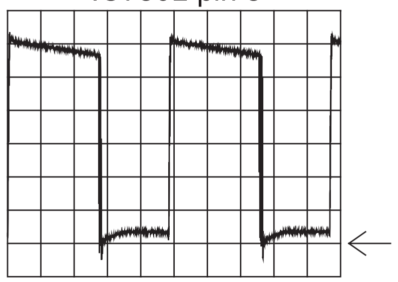
A: DC, 200mV/Div
10us/Div

D_Y 1904-9



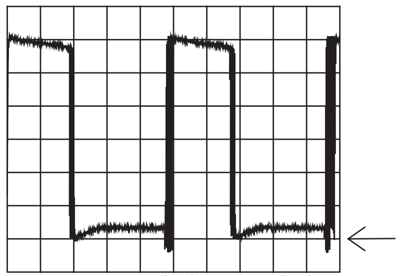
A: DC, 200mV/Div
10us/Div

IC7501 pin 5



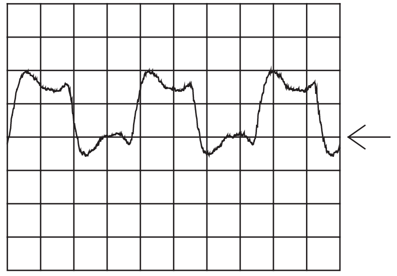
A: DC, 2 V/Div, 1us/Div

IC7501 pin 6



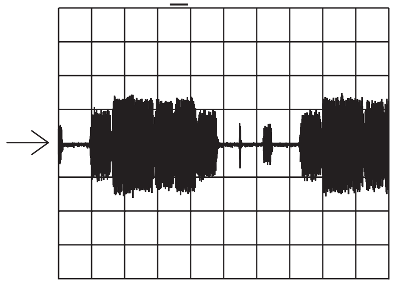
A: DC, 2 V/Div, 1us/Div

IC7703 pin 25



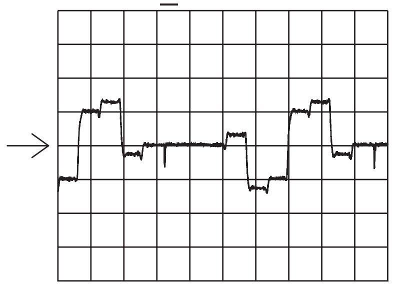
A: DC, 2 V/Div, 10ns/Div

D_C 1904-7



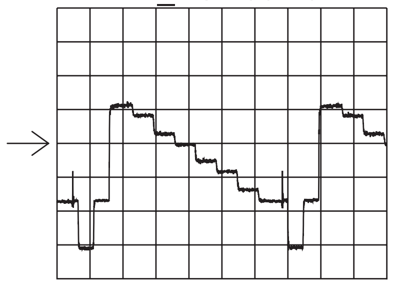
A: DC, 200mV/Div
10us/Div

D_VR 1904-5



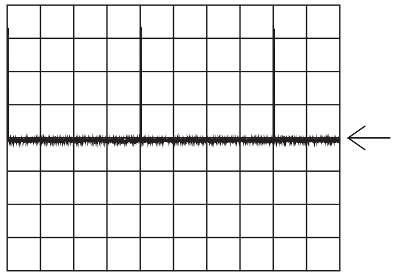
A: DC, 200mV/Div
10us/Div

D_YG 1904-3



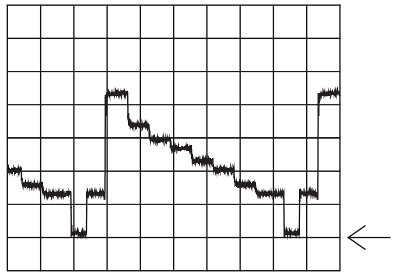
A: DC, 200mV/Div
10us/Div

VS_IN



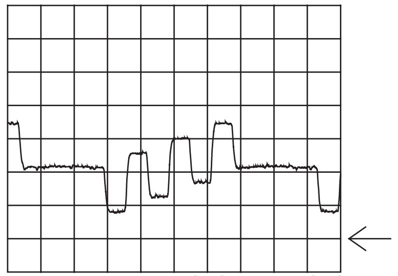
A: DC, 1 V/Div, 5ms/Div

1704-2, F1702



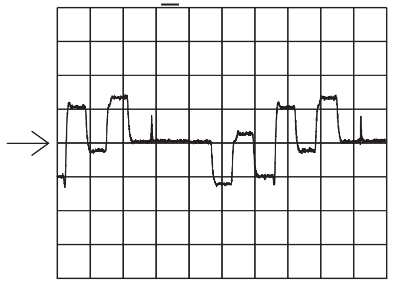
A: DC, 500mV/Div, 5us/Div

IC7703 pin 32



A: DC, 200mV/Div, 5us/Div

D_UB 1904-1

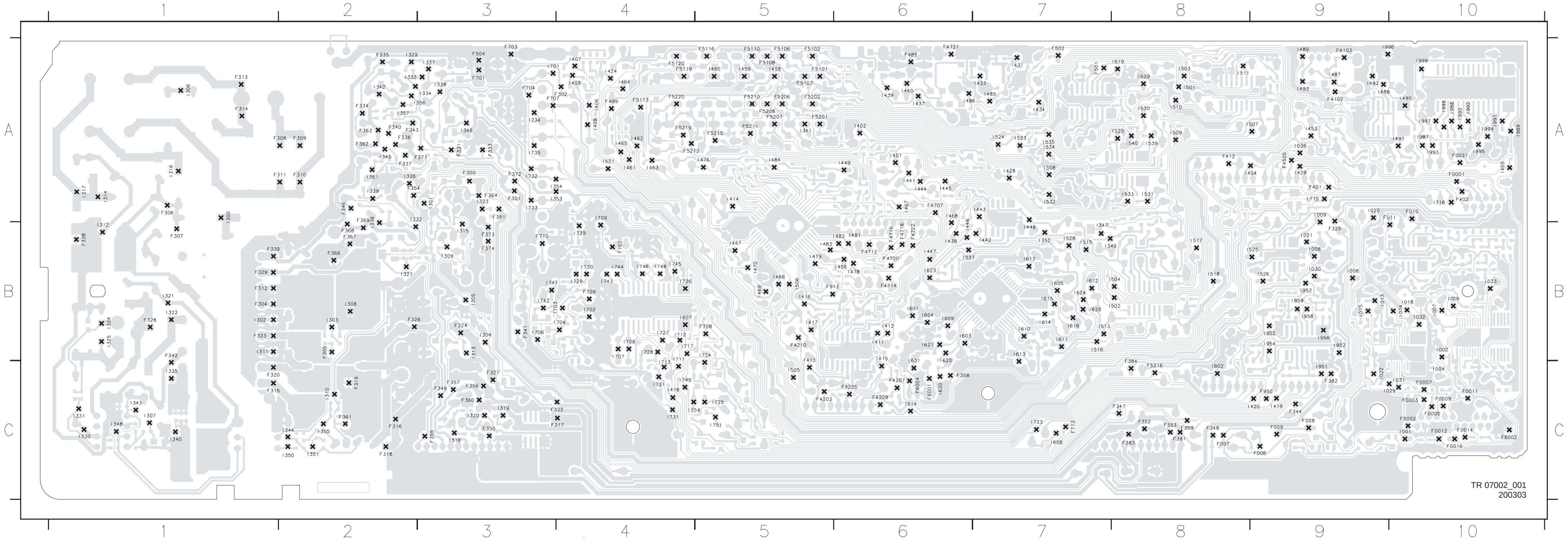


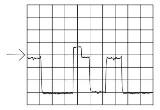
A: DC, 200mV/Div
10us/Div

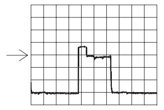
TR 09014_001
220403

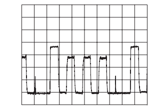
Test points overview Analog Board

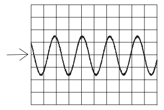
F0001	A10
F0002	C10
F0003	C10
F0005	C10
F0007	C10
F0009	C10
F0010	C9
F0011	C10
F0012	C10
F0014	C10
F0016	C10
F0021	A10
F006	C9
F007	C8
F008	C9
F009	C9
F010	A10
F011	B10
F300	A3
F301	A3
F302	A4
F304	B1
F305	B2
F306	A1
F307	B1
F308	A2
F309	A2
F310	A2
F311	A2
F312	B1
F313	A1
F314	A1
F315	C1
F316	C2
F317	C4
F318	C2
F319	C2
F320	C1
F321	C3
F322	C4
F323	B1
F324	B3
F325	A9
F326	B2
F328	B1
F329	B1
F331	A3
F333	A3
F334	A2
F335	A2
F336	A2
F337	A2
F338	B1
F339	B1
F340	A2
F341	B3
F342	C1
F343	A2
F344	C9
F346	A2
F347	C8
F348	C8
F349	C3
F350	C3
F351	A3
F352	C8
F353	C8
F354	A2
F355	C3
F356	C3
F357	C3
F358	C6
F359	C8
F360	C3
F361	C2
F362	A2
F363	A2
F364	A3
F366	B2
F367	B2
F368	B2
F369	B2
F371	A3
F372	A3
F373	B3
F374	B3
F381	C8
F382	C9
F383	C8
F384	C8
F401	A9
F4102	A9
F4103	A9
F412	A8
F4203	C5
F4205	C6
F4207	C6
F4209	C6
F4210	B5
F4505	A9
F4707	A6
F4712	B6
F4714	B6
F4716	B6
F4718	B6
F4720	B6
F4721	A6
F4722	B6
F485	A6
F499	A4
F501	A7
F502	A7
F504	A3
F5101	A5
F5102	A5
F5103	A5
F5106	A5
F5108	A5
F5110	A5
F5113	A4
F5116	A5
F5119	A4
F5120	A4
F5201	A5
F5202	A5
F5203	A5
F5206	A5
F5207	A5
F5208	A5
F5210	A5
F5211	A5
F5213	A4
F5215	A5
F5216	C8
F5219	A4
F5220	A4
F6001	C6
F6002	C10
F6004	C6
F701	A3
F702	B4
F703	A3
F704	A3
F707	A3
F708	B5
F709	B4
F710	B3
F713	C7
F913	B5
F950	C9
I001	C10
I002	B10
I004	C10
I005	B10
I006	B9
I007	B10
I008	B9
I009	B9
I013	B9
I014	B10
I015	B9
I018	B10
I019	B10
I020	A9
I021	B9
I022	C9
I023	B10
I029	C10
I030	B9
I031	C10
I032	B10
I036	A9
I300	A1
I301	A3
I303	B2
I304	B3
I305	B3
I306	A1
I307	C1
I308	B2
I309	B3
I310	C2
I311	B1
I312	B1
I313	B3
I314	A1
I315	B3
I316	A1
I317	A1
I318	C3
I319	C3
I320	C3
I321	B1
I322	B1
I323	A3
I324	B1
I325	B1
I326	A2
I327	B2
I329	A2
I330	C1
I331	C1
I332	B2
I333	A3
I334	A2
I335	C1
I336	B2
I337	A3
I338	A3
I339	A2
I340	C1
I341	A5
I342	A2
I343	C1
I344	C2
I345	A2
I346	A3
I347	B7
I348	C1
I349	B7
I350	C2
I351	C2
I352	B7
I353	A3
I354	A3
I355	C2
I356	A2
I357	A2
I361	A2
I402	A6
I405	A10
I406	A4
I407	A4
I408	A4
I409	A4
I411	B6
I412	B6
I413	C5
I414	A5
I415	C6
I416	B5
I417	B5
I418	C4
I419	C9
I420	C9
I424	A4
I428	A7
I429	A9
I431	A7
I433	A7
I434	A7
I437	A6
I438	B6
I439	A6
I440	A6
I441	A6
I442	B7
I443	A7
I444	A6
I445	A6
I446	B6
I447	B6
I448	A7
I449	A6
I451	A6
I453	A9
I454	A9
I456	B6
I457	B5
I458	A5
I459	A5
I460	A5
I461	A4
I462	A4
I463	A4
I464	A4
I465	A4
I466	B5
I467	A6
I468	B6
I469	B5
I470	B5
I476	A5
I478	B6
I479	B5
I481	B6
I482	B6
I483	B5
I484	A5
I485	A7
I486	A6
I487	A9
I488	A9
I489	A9
I490	A10
I491	A10
I492	A9
I493	A9
I501	A8
I502	B8
I503	A8
I504	B8
I505	C5
I506	B5
I507	A9
I508	A7
I509	A8
I510	A8
I511	A8
I513	B7
I514	C6
I515	B7
I516	B7
I517	B8
I518	B8
I519	A8
I520	A8
I521	A4
I523	A7
I524	A7
I525	B9
I526	B9
I527	B6
I611	B7
I612	B7
I613	C7
I614	B7
I615	B7
I616	B7
I617	B7
I620	B6
I621	B6
I623	B6
I624	B7
I625	B7
I630	C6
I631	C6
I701	A3
I702	B4
I703	B4
I704	B4
I706	B3
I528	B7
I529	A8
I530	A8
I531	A8
I532	A7
I533	A8
I534	A7
I535	A7
I539	A8
I540	A8
I601	B6
I602	C8
I603	B6
I604	B6
I605	B7
I607	B4
I608	C7
I609	B6
I610	B7
I707	B4
I708	B4
I709	B4
I711	C4
I712	B4
I713	C4
I715	A9
I716	A10
I717	B4
I721	C4
I723	C7
I724	C5
I725	C5
I726	B4
I727	B4
I728	B4
I729	B4
I730	B4
I731	C4
I732	A3
I733	A3
I734	A3
I735	A3
I739	B4
I741	B3
I742	B3
I743	B4
I744	B4
I745	B4
I746	B4
I748	B4
I749	C4
I751	C5
I754	C4
I951	C9
I952	B9
I954	B9
I955	B9
I956	B9
I957	B9
I958	B9
I959	B9
I987	A10
I988	A10
I989	A10
I990	A10
I991	A10
I992	A10
I993	A10
I994	A10
I995	A10
I996	A9
I997	A10
I998	A10
I999	A10

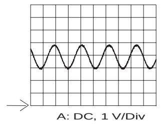


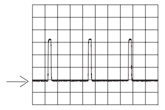

D_R F4718

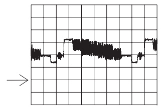

D_G F4720

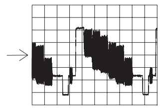

D_B F4722

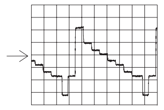

ARDAC/ALDAC F010/F011

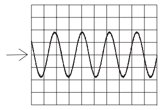

I623

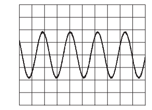

SYNC F843

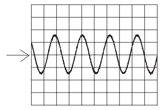

A_CVBS I405

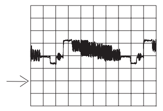

D_CVBS F4712

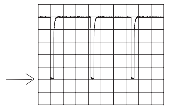

D_Y F4714

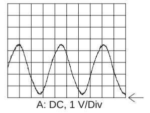

I502/I504

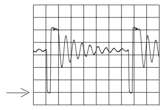

I517/I518

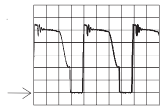

F501/F502

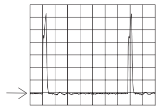

A_CVBS F8008

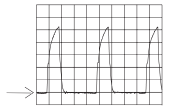

I818

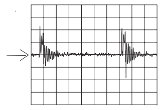

I994

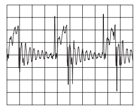

F327 VDrain (Standby)

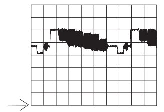

F327 VDrain (no disc loaded)

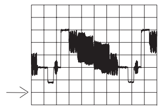

I324 VGate (Standby)

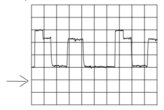

I324 VGate (no disc loaded)

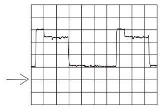

I324 VSource (Standby)

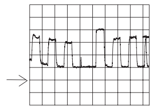

I324 VSource (no disc loaded)

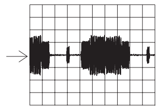

F723 VFV I723

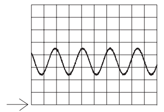

E465

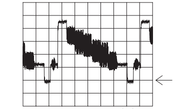

E461


E462

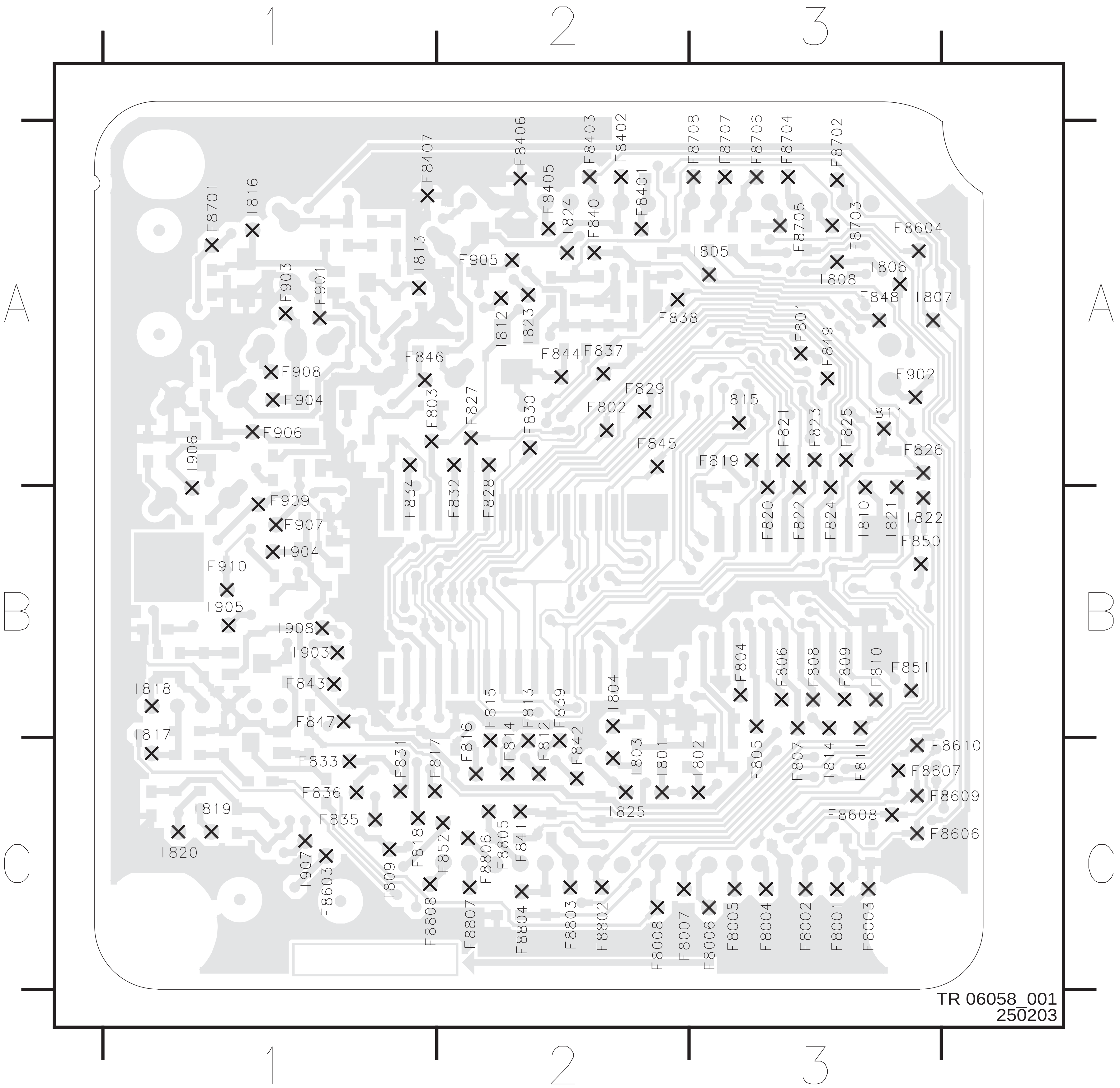

E463


D_C F4716


I014/I032


I989

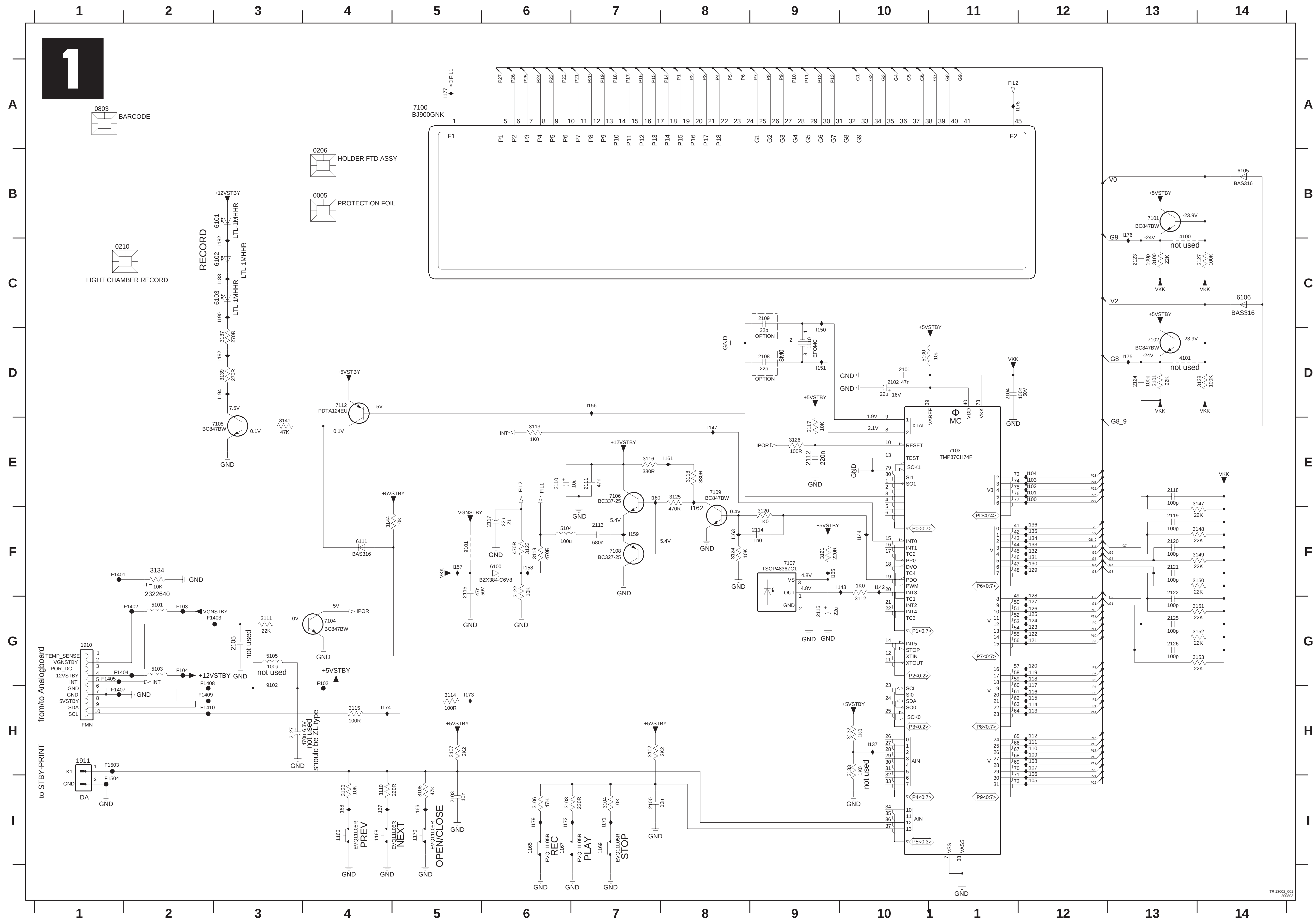
Test points overview UP Sub Board



F8001	C3	F831	C1	F8610	C3	I808	A3
F8002	C3	F832	A2	F8701	A1	I809	C1
F8003	C3	F833	C1	F8702	A3	I810	B3
F8004	C3	F834	A1	F8703	A3	I811	A3
F8005	C3	F835	C1	F8704	A3	I812	A2
F8006	C3	F836	C1	F8705	A3	I813	A1
F8007	C2	F837	A2	F8706	A3	I814	B3
F8008	C2	F838	A2	F8707	A3	I815	A3
F801	A3	F839	C2	F8708	A3	I816	A1
F802	A2	F840	A2	F8802	C2	I817	C1
F803	A1	F8401	A2	F8803	C2	I818	B1
F804	B3	F8402	A2	F8804	C2	I819	C1
F805	B3	F8403	A2	F8805	C2	I820	C1
F807	B3	F8406	A2	F8806	C2	I821	B3
F812	C2	F8407	A1	F8807	C2	I822	B3
F813	C2	F841	C2	F8808	C1	I823	A2
F814	C2	F842	C2	F901	A1	I824	A2
F815	C2	F843	B1	F902	A3	I825	C2
F816	C2	F844	A2	F903	A1	I903	B1
F817	C1	F845	A2	F904	A1	I904	B1
F818	C1	F846	A1	F905	A2	I905	B1
F819	A3	F847	B1	F906	A1	I906	B1
F820	B3	F848	A3	F907	B1	I907	C1
F821	A3	F849	A3	F908	A1	I908	B1
F822	B3	F850	B3	F909	B1		
F823	A3	F851	B3	F910	B1		
F824	B3	F852	C2	I801	C2		
F825	A3	F8603	C1	I802	C3		
F826	A3	F8604	A3	I803	C2		
F827	A2	F8606	C3	I804	B2		
F828	A2	F8607	C3	I805	A3		
F829	A2	F8608	C3	I806	A3		
F830	A2	F8609	C3	I807	A3		

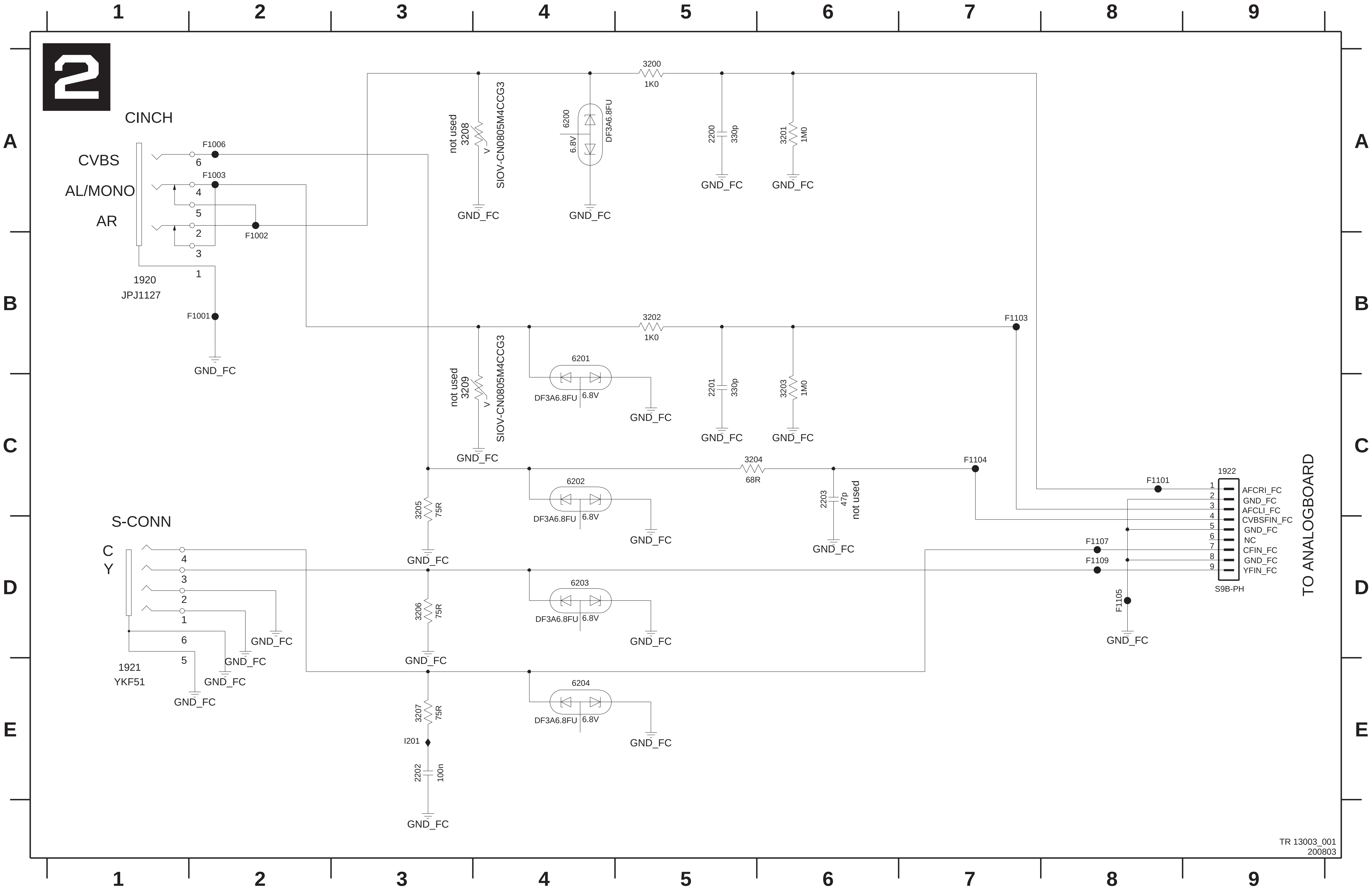
7. Circuit Diagrams and PWB Layouts

Display Board: Display Part (DISP)



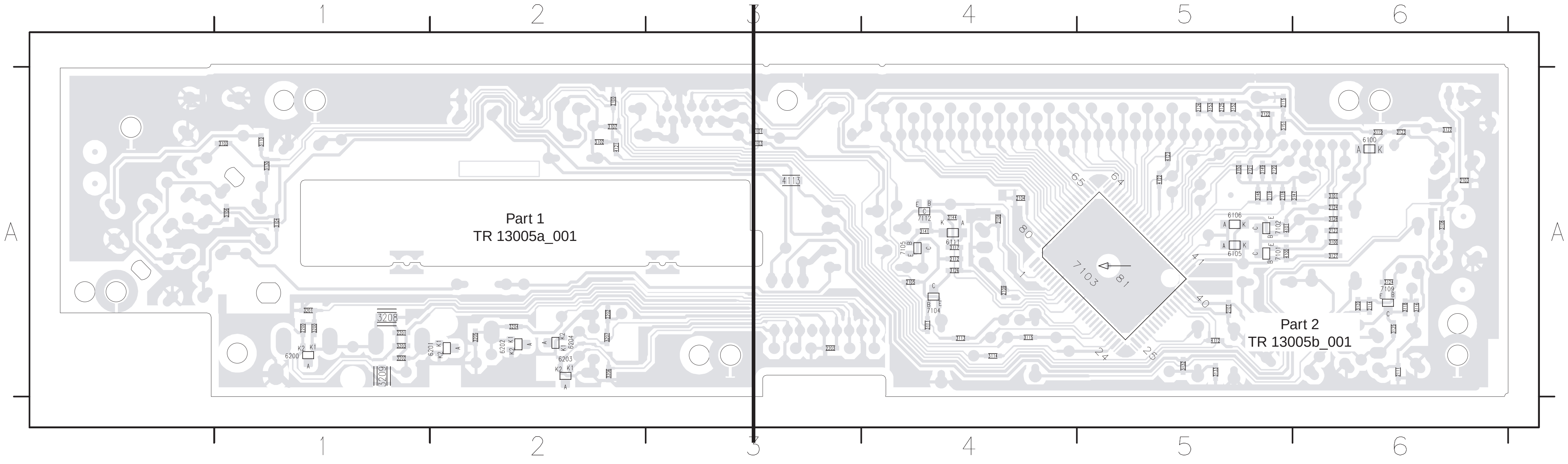
0005	B4
0206	B4
0210	C1
0803	A1
1110	D9
1165	I6
1166	I4
1167	I6
1168	I4
1169	I7
1170	I5
1910	G1
1911	H1
2100	I7
2101	D10
2102	D10
2103	I5
2104	D11
2105	G3
2108	D9
2109	C9
2110	E6
2111	E7
2112	E9
2113	F7
2114	F9
2115	F5
2116	G9
2117	F6
2118	E13
2119	F13
2120	F13
2121	F13
2122	F13
2123	C13
2124	D13
2125	G13
2126	G13
2127	H3
3100	C13
3101	D13
3102	H7
3103	I6
3104	I7
3106	I6
3107	H5
3108	I5
3110	I4
3111	G3
3112	G10
3113	E6
3114	H5
3115	H4
3116	E7
3117	E9
3118	E8
3119	F6
3120	F9
3121	F9
3122	F6
3123	F6
3124	F8
3125	E8
3126	E9
3127	C14
3128	D14
3130	I4
3132	H10
3133	H10
3134	F2
3137	D3
3139	D3
3141	E3
3144	F4
3147	E14
3148	F14
3149	F14
3150	F14
3151	G14
3152	G14
3153	G14
4100	C13
4101	D13
5100	D10
5101	G2
5103	G2
5104	F6
5105	G3
6100	F6
6101	B3
6102	C3
6103	C3
6105	B14
6106	C14
6111	F4
7100	A5
7101	B13
7102	D13
7103	E11
7104	G4
7105	E3
7106	E7
7107	F9
7108	F7
7109	E8
7112	D4
9101	F5
F102	G4
F103	G2
F104	G2
F1401	F1
F1402	G2
F1403	G3
F1404	G1
F1405	G1
F1407	H1
F1408	G2
F1409	H2
F1410	H2
F1503	H1
F1504	I1
I100	E12
I101	E12
I102	E12
I103	E12
I104	E12
I105	I12
I106	H12
I107	H12
I108	H12
I109	H12
I110	H12
I111	H12
I112	H12
I113	H12
I114	H12
I115	H12
I116	H12
I117	G12
I118	G12
I119	G12
I120	G12
I121	G12
I122	G12
I123	G12
I124	G12
I125	G12
I126	G12
I127	G12
I128	F12
I129	F12
I130	F12
I131	F12
I132	F12
I133	F12
I134	F12
I135	F12
I136	F12
I137	H10
I142	F10
I143	F10
I144	F10
I147	E8
I150	D9
I151	D9
I156	D7
I157	F5
I158	F6
I159	F7
I160	E7
I161	E8
I162	F8
I163	F8
I165	F9
I166	I5
I167	I4
I168	I4
I171	I7
I172	I6
I173	H5
I174	H4
I175	D13
I176	B13
I177	A5
I178	A11
I179	I6
I182	C3
I183	C3
I190	C3
I192	D3
I194	D3

Display Board: Front Connector (FC)

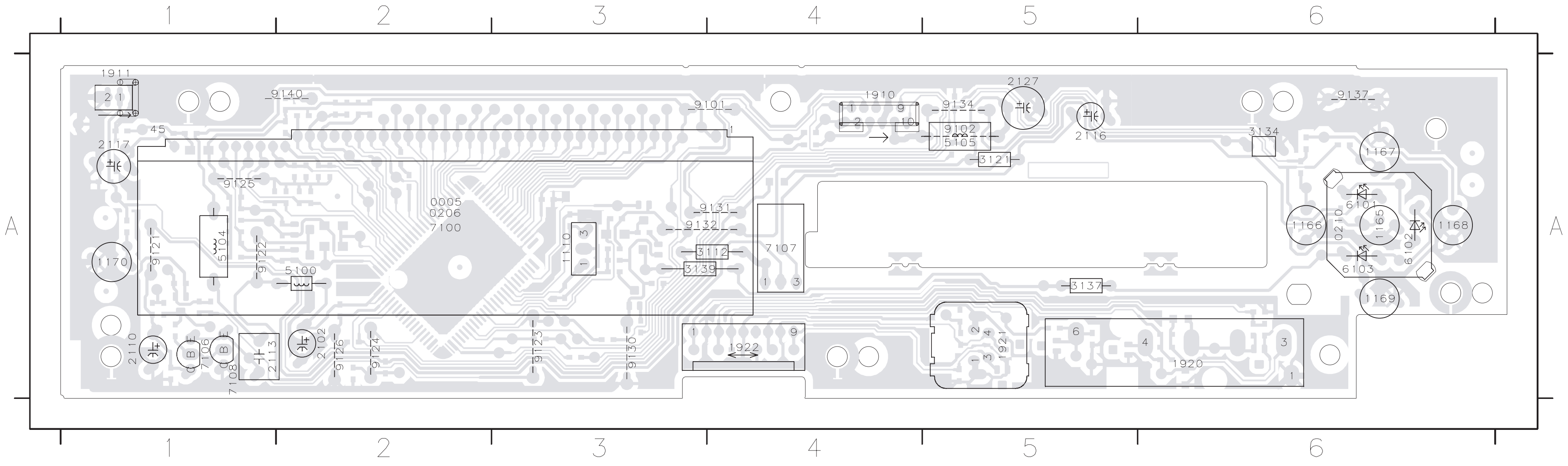


1920	B1
1921	E1
1922	C9
2200	A5
2201	C5
2202	E3
2203	C6
3200	A5
3201	A6
3202	B5
3203	C6
3204	C5
3205	C3
3206	D3
3207	E3
3208	A3
3209	C3
6200	A4
6201	B4
6202	C4
6203	D4
6204	E4
F1001	B2
F1002	B2
F1003	A2
F1006	A2
F1101	C8
F1103	C8
F1104	C8
F1105	C8
F1107	D8
F1109	D8
I201	E3

Layouts Display Panel



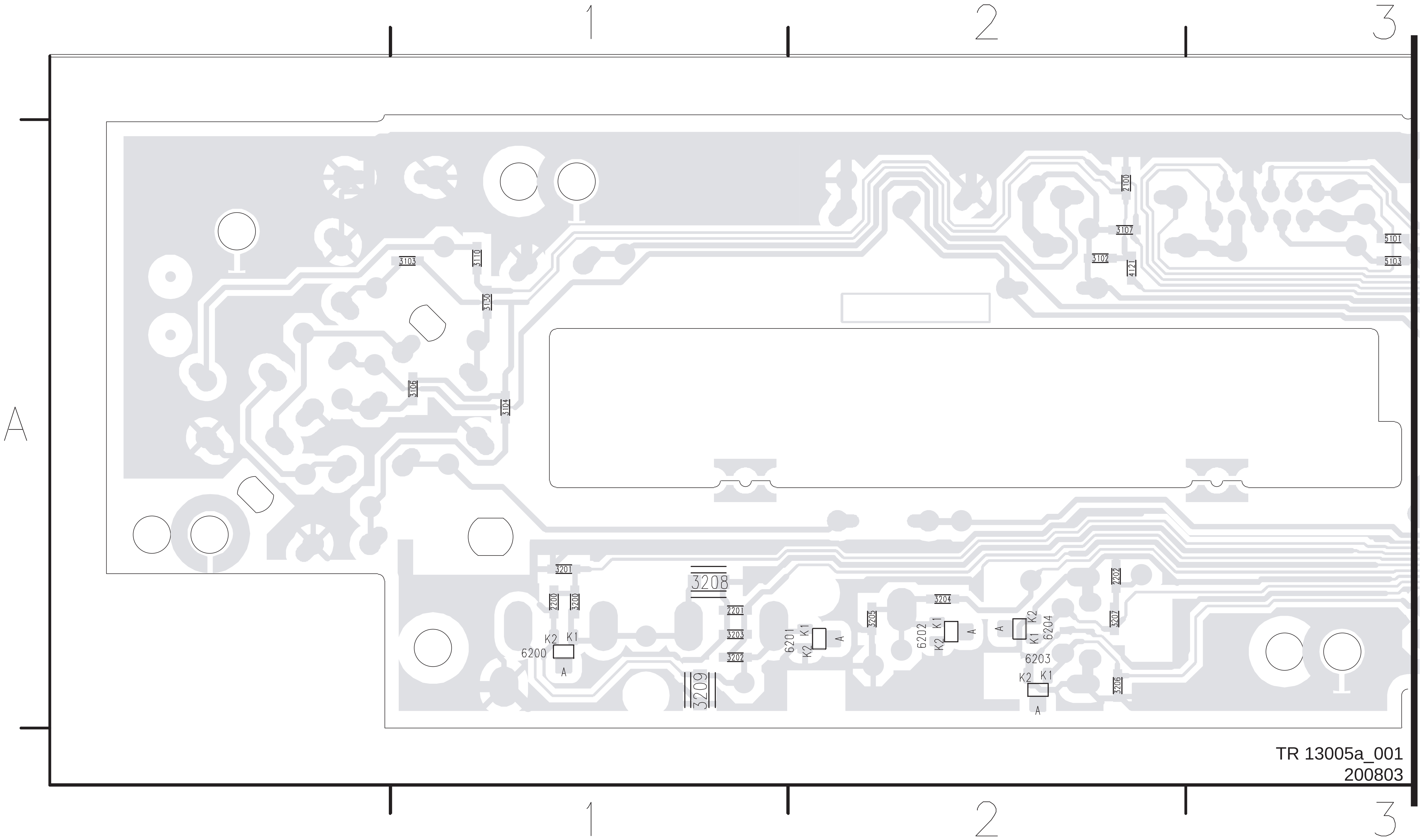
2100	A2
2101	A5
2103	A6
2104	A4
2105	A4
2108	A4
2109	A4
2111	A6
2112	A4
2114	A6
2115	A5
2118	A5
2119	A5
2120	A5
2121	A5
2122	A5
2123	A6
2124	A6
2125	A5
2126	A5
2200	A1
2201	A1
2202	A2
2203	A3
3100	A6
3101	A6
3102	A2
3103	A1
3104	A1
3106	A1
3107	A2
3108	A6
3110	A1
3111	A4
3113	A4
3114	A4
3115	A4
3116	A6
3117	A4
3118	A6
3119	A6
3120	A6
3122	A6
3123	A6
3124	A6
3125	A6
3126	A4
3127	A6
3128	A6
3130	A1
3132	A5
3133	A5
3141	A4
3144	A4
3147	A6
3148	A5
3149	A5
3150	A5
3151	A5
3152	A5
3153	A5
3200	A1
3201	A1
3202	A1
3203	A1
3204	A2
3205	A2
3206	A2
3207	A2
3208	A1
3209	A1
4100	A5
4101	A5
4112	A5
4113	A3
4121	A2
4122	A5
4123	A5
5101	A3
5103	A3
6100	A6
6105	A5
6106	A5
6111	A4
6200	A1
6201	A2
6202	A2
6203	A2
6204	A2
7101	A5
7102	A5
7103	A5
7104	A4
7105	A4
7109	A6
7112	A4



0005	A2
0206	A2
0210	A6
1110	A3
1165	A6
1166	A6
1167	A6
1168	A6
1169	A6
1170	A1
1910	A4
1911	A1
1920	A6
1921	A5
1922	A4
2102	A2
2110	A1
2113	A1
2116	A5
2117	A1
2127	A5
3112	A4
3121	A5
3134	A6
3137	A5
3139	A3
5100	A2
5104	A1
5105	A5
6101	A6
6102	A6
6103	A6
7100	A2
7106	A1
7107	A4
7108	A1
9101	A4
9102	A5
9121	A1
9122	A1
9123	A3
9124	A2
9125	A1
9126	A2
9130	A3
9131	A4
9132	A3
9134	A5
9137	A6
9140	A2

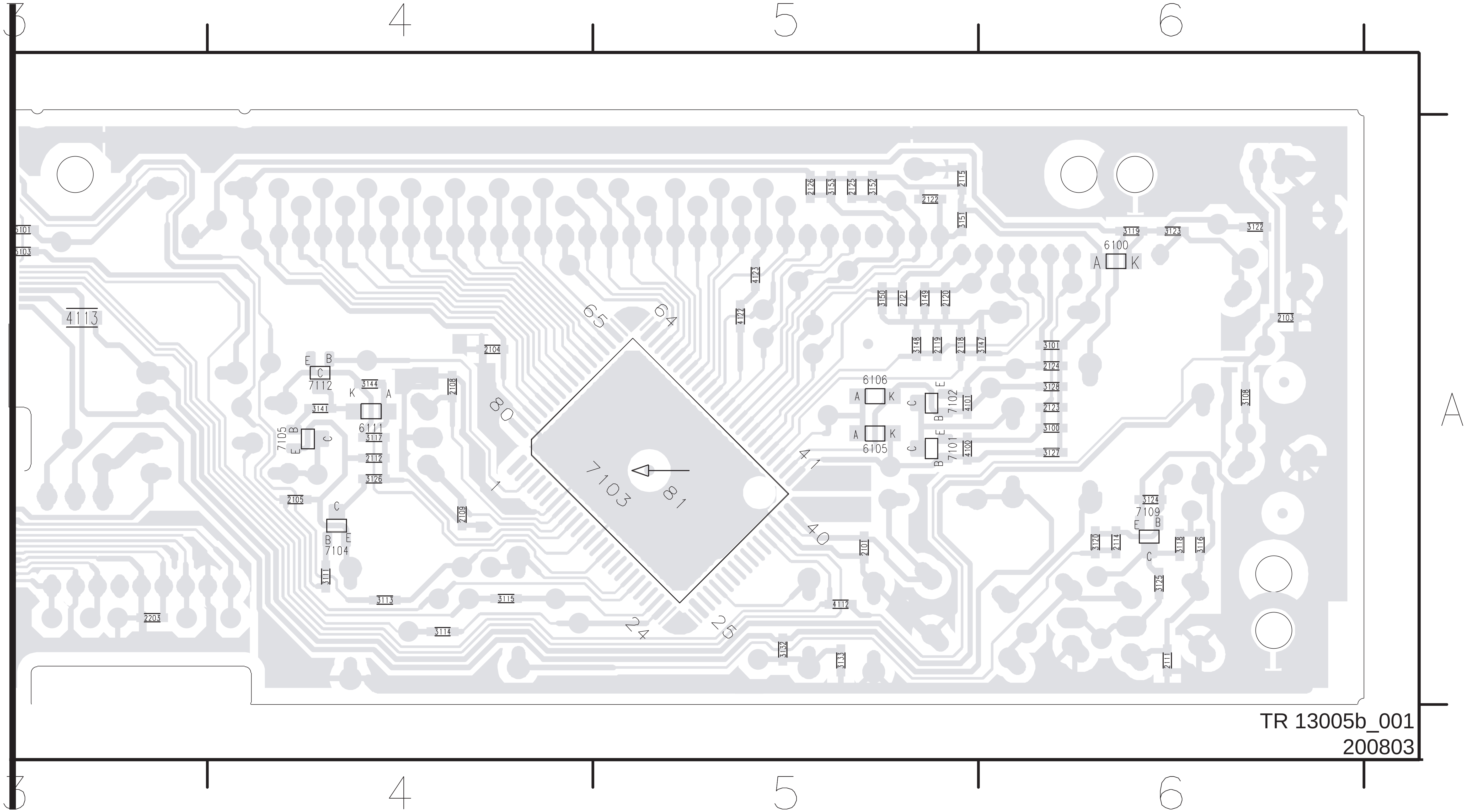
TR 13005_001
200803

Layout Display Panel (Part 1 Bottom View)



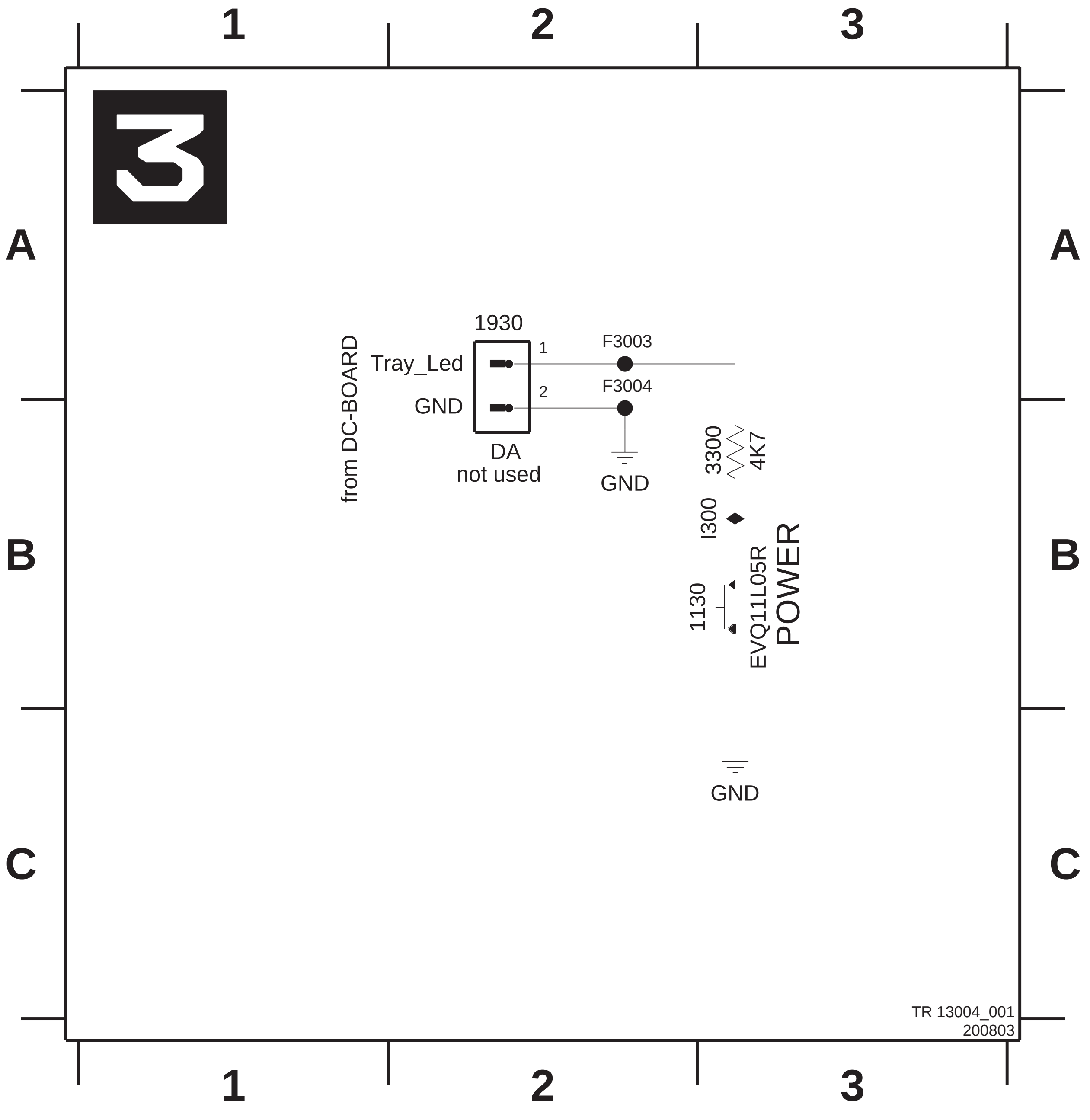
TR 13005a_001
200803

Layout Display Panel (Part 2 Bottom View)

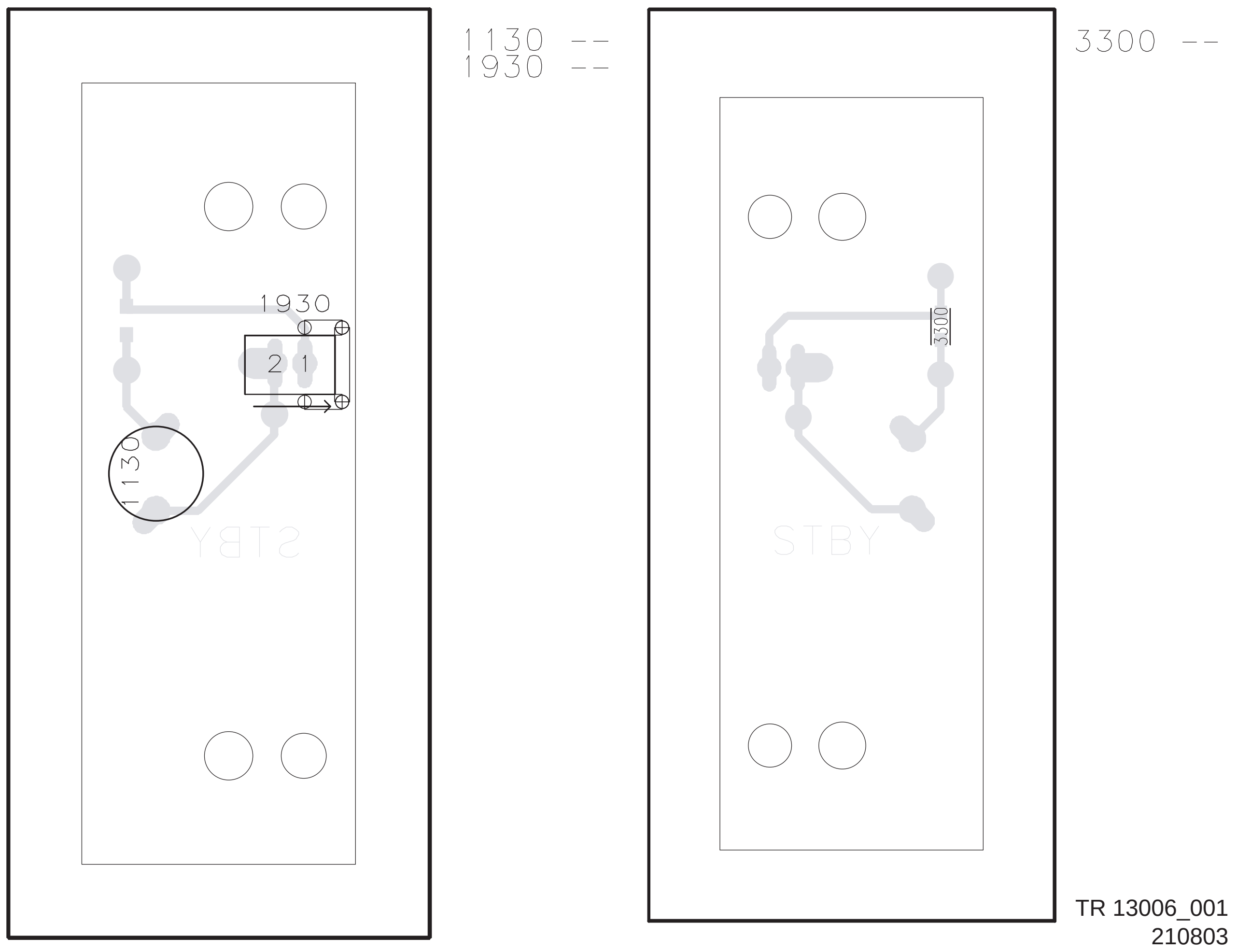


Display Board: Standby (STBY)

1130	**B3**
1930	**A2**
3300	**B3**
F3003	**A2**
F3004	**A2**
I300	**B3**

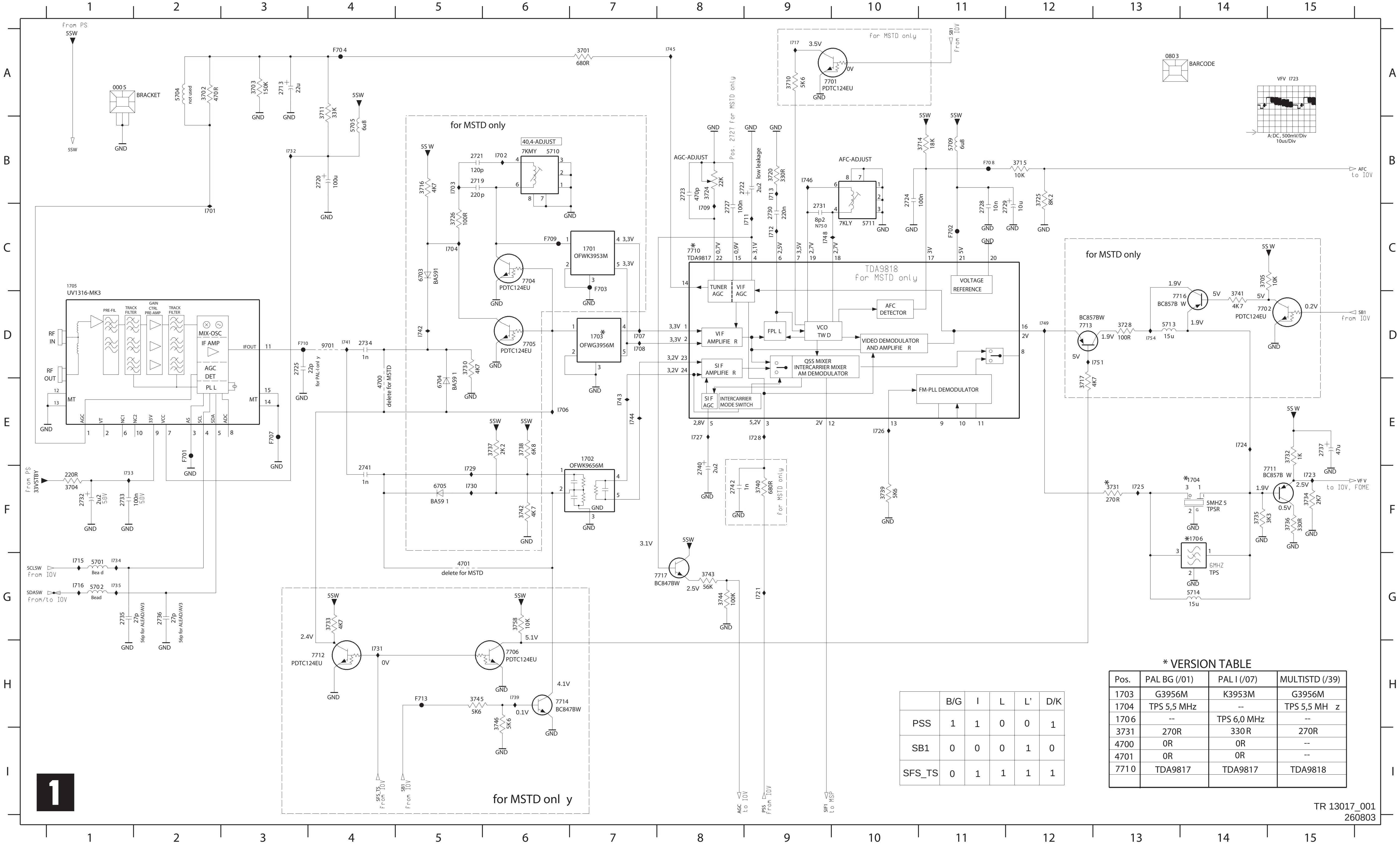


Layout Standby (STBY)



Analog Board: Frontend Video (FV)

0005 A1
0803 A13
1701 C7
1702 E7
1703 D7
1704 F1 4
1705 C1
1706 F14
2713 A3
2719 B5
2720 B4
2721 B5
2722 B8
2723 B8
2724 B10
2725 D3
2727 C8
2728 C1 1
2729 C1 2
2730 C9
2731 C9
2732 F1
2733 F1
2734 D4
2735 G1
2736 G2
2737 E15
2740 F8
2741 F4
2742 F8
3701 A7
3702 A2
3703 A3
3704 F1
3705 C14
3710 A9
3711 A4
3714 B11
3715 B12
3716 B5
3717 E12
3720 B9
3724 B8
3725 B12
3726 C5
3728 D13
3730 D5
3731 F1 3
3732 E15
3733 G4
3734 F15
3735 F14
3736 F15
3737 E6
3738 E6
3739 F10
3740 F9
3741 D14
3742 F6
3743 G8
3744 G8
3745 H5
3746 H6
3758 G6
4700 E4
4701 G5
5701 G1
5702 G1
5704 A2
5705 B4
5709 B1 1
5710 B6
5711 C10
5713 D13
5714 G14
6703 C5
6704 E5
6705 F5
7701 A10
7702 D15
7704 C6
7705 D6
7706 H6
7710 C8
7711 F1 4
7712 H4
7713 D1 2
7714 H6
7716 D14
7717 G7
9701 D4
F701 E2
F702 C11
F703 D7
F704 A4
F707 E3
F708 B1 1
F709 C6
F710 D3
F713 H5
I701 C2
I702 B6
I703 B5
I704 C5
I706 E6
I707 D7
I708 D7
I709 C8
I711 C9
I712 C9
I713 B9
I715 G1
I716 G1
I717 A9
I721 G9
I723 F1 5
I724 E14
I725 F1 3
I726 E10
I727 E8
I728 E9
I729 F5
I730 F5
I731 H4
I732 B3
I733 F1
I734 G1
I735 G1
I739 H6
I741 D4
I742 D5
I743 E7
I744 E7
I745 A8
I746 B9
I748 C9
I749 D12
I751 D13
I754 D13



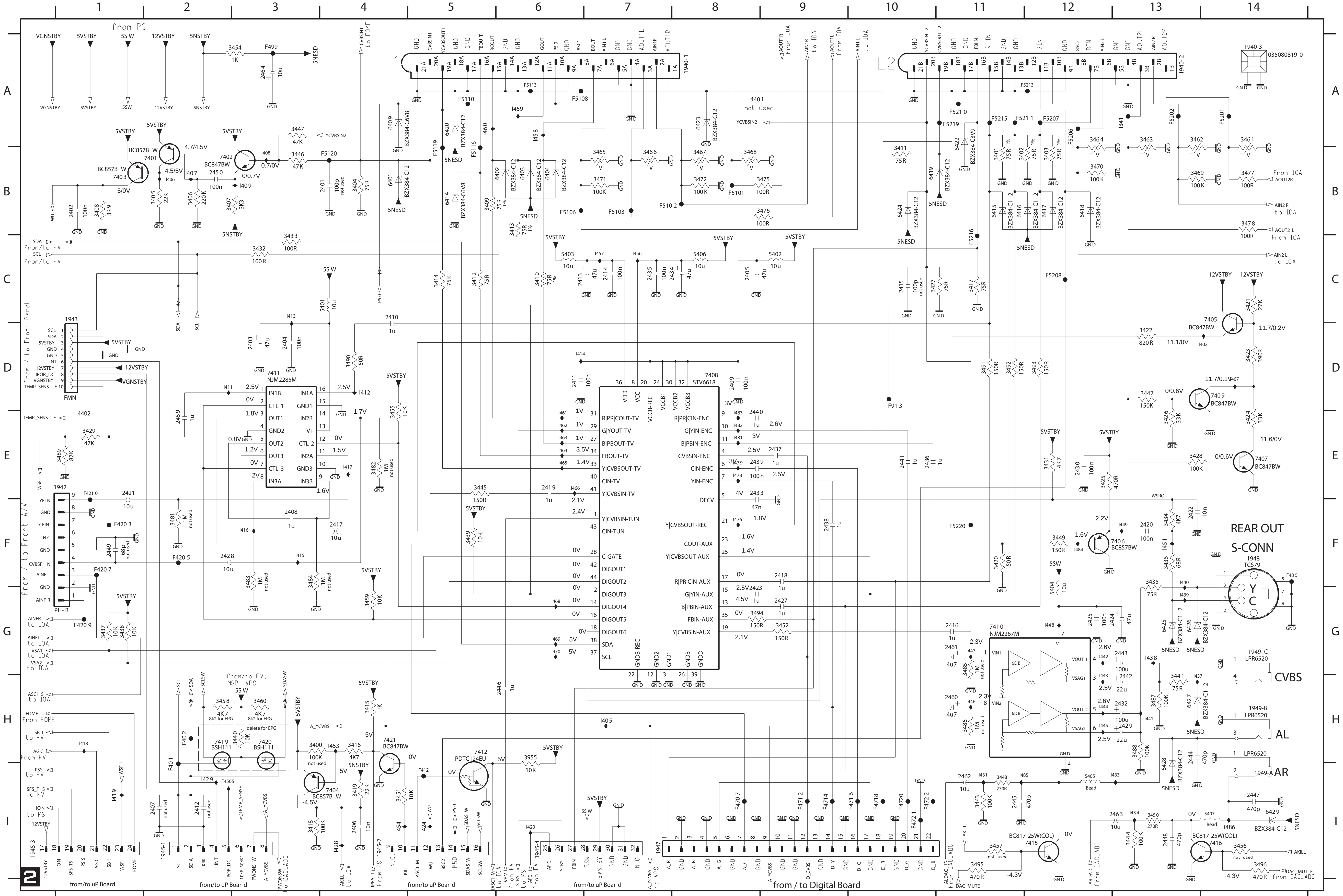
	B/G	I	L	L'	D/K
PSS	1	1	0	0	1
SB1	0	0	0	1	0
SFS_TS	0	1	1	1	1

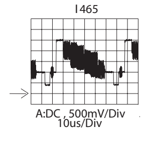
* VERSION TABLE

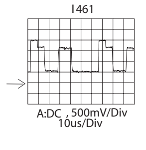
Pos.	PAL BG (/01)	PAL I (/07)	MULTISTD (/39)
1703	G3956M	K3953M	G3956M
1704	TPS 5,5 MHz	--	TPS 5,5 MH z
1706	--	TPS 6,0 MHz	--
3731	270R	330R	270R
4700	0R	0R	--
4701	0R	0R	--
7710	TDA9817	TDA9817	TDA9818

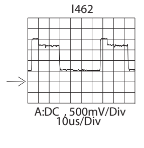
TR 13017_001
260803

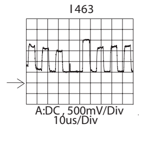
Analog Board: In/Out Video (IOV)

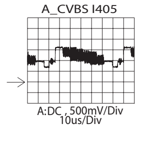


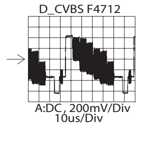


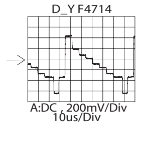


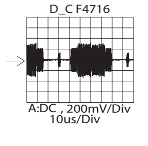


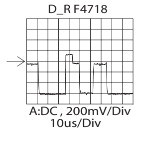


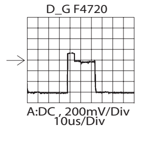


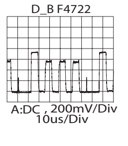








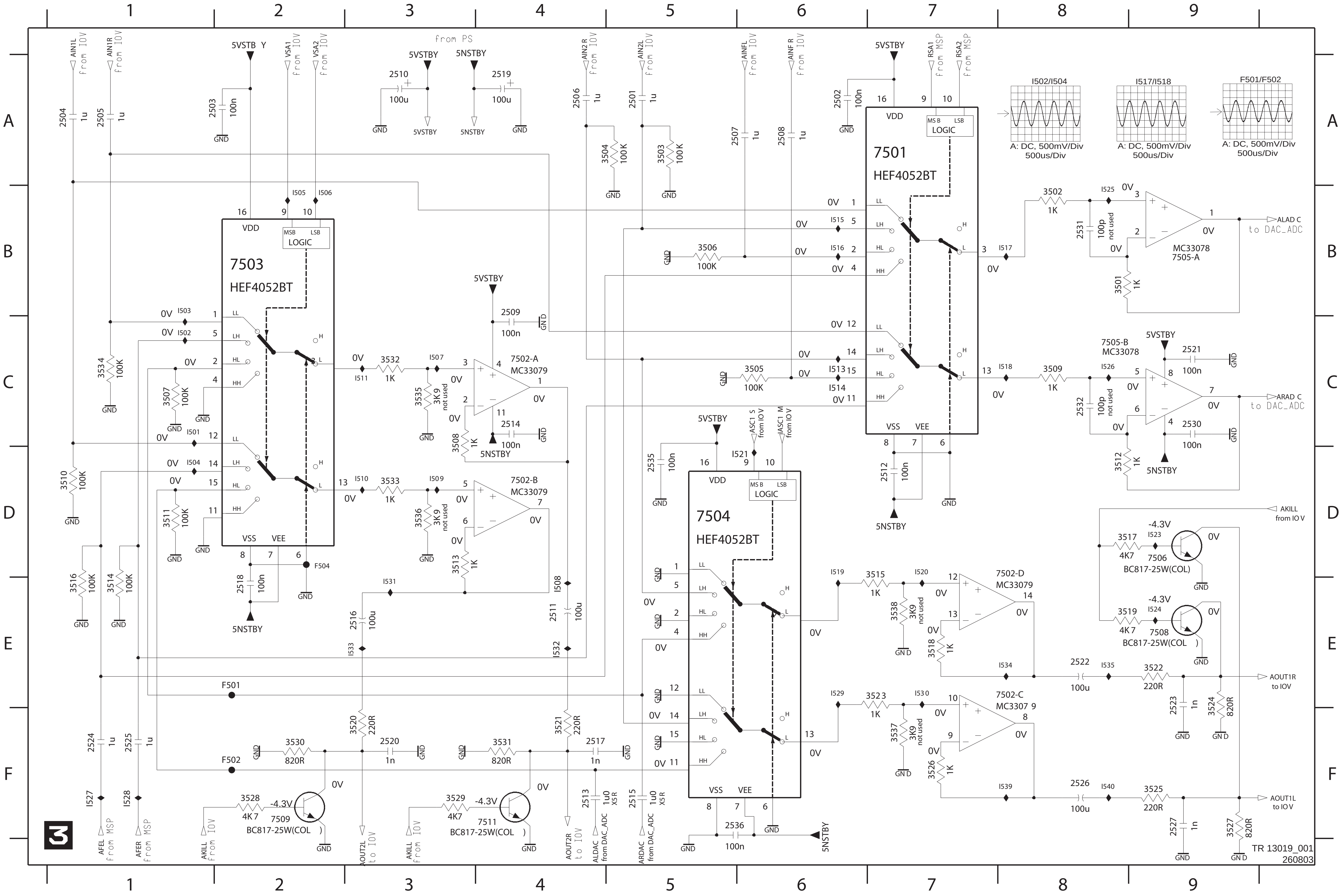




TR13018_001
260803

1940-1	A8
1940-2	A13
1940-3	A14
1942	E1
1943	C1
1945-1	I2
1947	I7
1948	F14
1949-A	I14
1949-B	H14
1949-C	G14
2401	B4
2402	B1
2403	D3
2404	D3
2405	C8
2406	I4
2407	I2
2408	F3
2409	D8
2410	C4
2411	D6
2412	I2
2413	C6
2414	C7
2415	C10
2416	G11
2417	F4
2418	F9
2419	E6
2420	F13
2421	E1
2422	F13
2423	G8
2424	G13
2425	G12
2427	G9
2428	F2
2429	H13
2430	E12
2432	H13
2433	E8
2434	C8
2435	C7
2436	E10
2437	E9
2438	F9
2439	E8
2440	E8
2441	E10
2442	H13
2443	G13
2444	H13
2445	I11
2446	H6
2447	I14
2448	I13
2449	F1
2450	B2
2459	E2
2460	H11
2461	G11
2462	I11
2463	I13
2464	A3
3400	H3
3401	B11
3402	B11
3403	B12
3404	B4
3405	B2
3406	B2
3407	B2
3408	B1
3409	B5
3410	C6
3411	B10
3412	C5
3413	B6
3414	C5
3415	H4
3416	H4
3417	C11
3418	I3
3419	I4
3420	F11
3421	C14
3422	D13
3423	D14
3424	E14
3425	E12
3426	E13
3427	C10
3428	E13
3429	E1
3431	E12
3432	C3
3433	C3
3434	F13
3435	F13
3436	F13
3437	G1
3438	G1
3439	F5
3440	H3
3441	H13
3442	D13
3443	I11
3444	I13
3445	E5
3446	B3
3447	A3
3448	I11
3449	F12
3450	I13
3451	I4
3452	G9
3454	A3
3455	E4
3456	I14
3457	I11
3458	H2
3459	G4
3460	H3
3461	A14
3462	A13
3463	A13
3464	A12
3465	B7
3466	B7
3467	B8
3468	B8
3469	B13
3470	B12
3471	B7
3472	B8
3475	B9
3476	B9
3477	B14
3478	B14
3481	F2
3482	E4
3483	F3
3484	F3
3485	G11
3486	H11
3487	H13
3488	H13
3489	E1
3490	D4
3491	D11
3492	D11
3493	D12
3494	G8
3495	I11
3496	I14
3955	H6
4401	A8
4402	E1
5401	C4
5402	C9
5403	C6
5404	G12
5405	I12
5406	C8
5407	I14
6401	B4
6402	B6
6403	B6
6404	B6
6409	A4
6414	B5
6415	B11
6416	B11
6417	B12
6418	B12
6419	B10
6420	A5
6422	A11
6423	A8
6424	B10
6425	G13
6426	G13
6427	H13
6428	I13
6429	I14
7401	B2
7402	B3
7403	B1
7404	I4
7405	C14
7406	F12
7407	E14
7408	D8
7409	D14
7410	G11
7411	D3
7412	H5
7415	I12
7416	I14
7419	H2
7420	H3
7421	H4
F401	I2
F402	H2
F412	I5
F4203	F1
F4205	F2
F4207	F1
F4209	G1
F4210	E1
F4505	I2
F4707	I8
F4712	I9
F4714	I9
F4716	I10
F4718	I10
F4720	I10
F4721	I10
F4722	I10
F485	F14
F499	A3
F5101	B8
F5102	B7
F5103	B7
F5106	B6
F5108	A6
F5110	A5
F5113	A6
F5116	B5
F5119	B5
F5120	B4
F5201	A14
F5202	A13
F5206	A12
F5207	A12
F5208	C12
F5210	A11
F5211	A12
F5213	A12
F5215	A11
F5216	C11
F5219	A11
F5220	F11
F913	D10
I341	A13
I402	D14
I405	H7
I406	B2
I407	B2
I408	B3
I409	B3
I411	D2
I412	D4
I413	C3
I414	D6
I415	F3
I416	F3
I417	E4
I418	H1
I419	I1
I420	I6
I424	I5
I428	I4
I429	I2
I431	I11
I433	I13
I434	I13
I437	H13
I438	G13
I439	G13
I440	F13
I441	H13
I442	G12
I443	H12
I444	H12
I445	H12
I446	H11
I447	G11
I448	G12
I449	F13
I451	F13
I453	H4
I454	I4
I456	C7
I457	C7
I458	A6
I459	A6
I460	A5
I461	E6
I462	E6
I463	E6
I464	E6
I465	E6
I466	E6
I467	D14
I468	G6
I469	G6
I470	G6
I476	F8
I478	E8
I479	E8
I481	E8
I482	E8
I483	E8
I484	F12
I485	I11
I486	I14

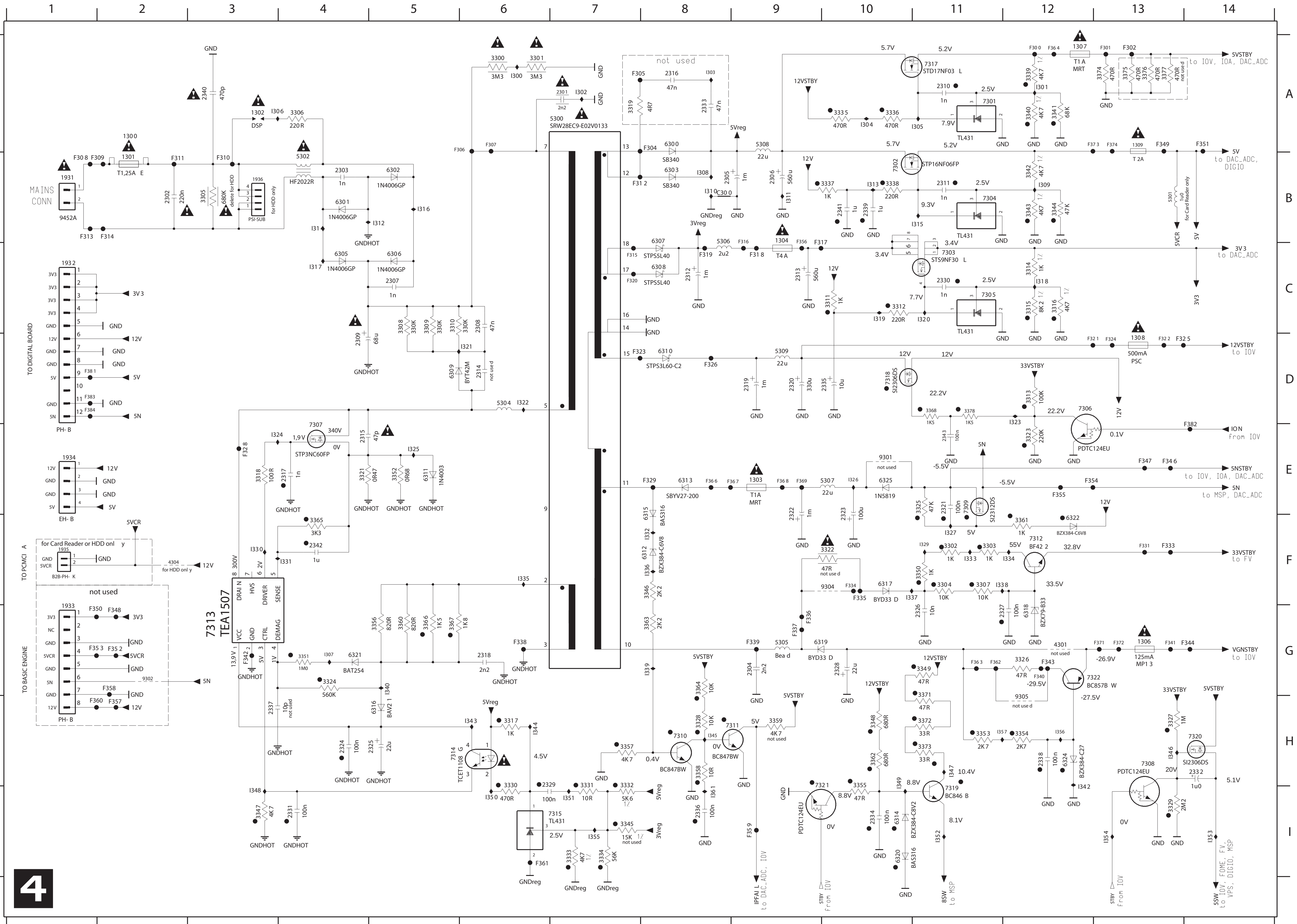
Analog Board: IN/Out Audio (IOA)

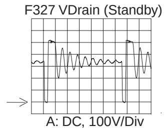


TR 13019_001
260803

2501	A5
2502	A6
2503	A2
2504	A1
2505	A1
2506	A4
2507	A6
2508	A6
2509	B4
2510	A3
2511	E4
2512	D7
2513	F4
2514	C4
2515	F5
2516	E3
2517	F4
2518	E2
2519	A4
2520	F3
2521	C9
2522	E8
2523	E9
2524	F1
2525	F1
2526	F8
2527	F9
2530	C9
2531	B8
2532	C8
2535	D5
2536	F5
3501	B8
3502	B8
3503	A5
3504	A5
3505	C6
3506	B5
3507	C1
3508	C3
3509	C8
3510	D1
3511	D1
3512	D8
3513	D3
3514	E1
3515	D7
3516	E1
3517	D8
3518	E7
3519	E8
3520	F3
3521	F4
3522	E9
3523	E7
3524	E9
3525	F9
3526	F7
3527	F9
3528	F2
3529	F3
3530	F2
3531	F4
3532	C3
3533	D3
3534	C1
3535	C3
3536	D3
3537	F7
3538	E7
7501	A7
7502-A	C4
7502-B	D4
7502-C	E7
7502-D	D7
7503	B2
7504	D5
7505-A	B9
7505-B	C8
7506	D9
7508	E9
7509	F2
7511	F4
F501	E2
F502	F2
F504	D2
I501	C1
I502	C1
I503	B1
I504	D1
I505	B2
I506	B2
I507	C3
I508	E4
I509	D3
I510	D3
I511	C3
I513	C6
I514	C6
I515	B6
I516	B6
I517	B8
I518	C8
I519	D6
I520	D7
I521	D6
I523	D9
I524	E9
I525	B8
I526	C8
I527	F1
I528	F1
I529	E6
I530	E7
I531	E3
I532	E4
I533	E3
I534	E8
I535	E8
I539	F8
I540	F8

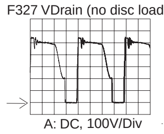
Analog Board: Power Supply (PS)





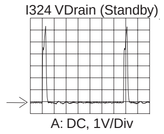
F327 VDrain (Standby)

A: DC, 100V/Div
5us/Div



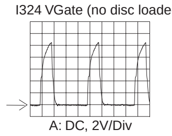
F327 VDrain (no disc loaded)

A: DC, 100V/Div
2us/Div



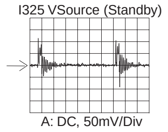
I324 VDrain (Standby)

A: DC, 1V/Div
5us/Div



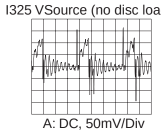
I324 VGate (no disc loaded)

A: DC, 2V/Div
2us/Div



I325 VSource (Standby)

A: DC, 50mV/Div
5us/Div



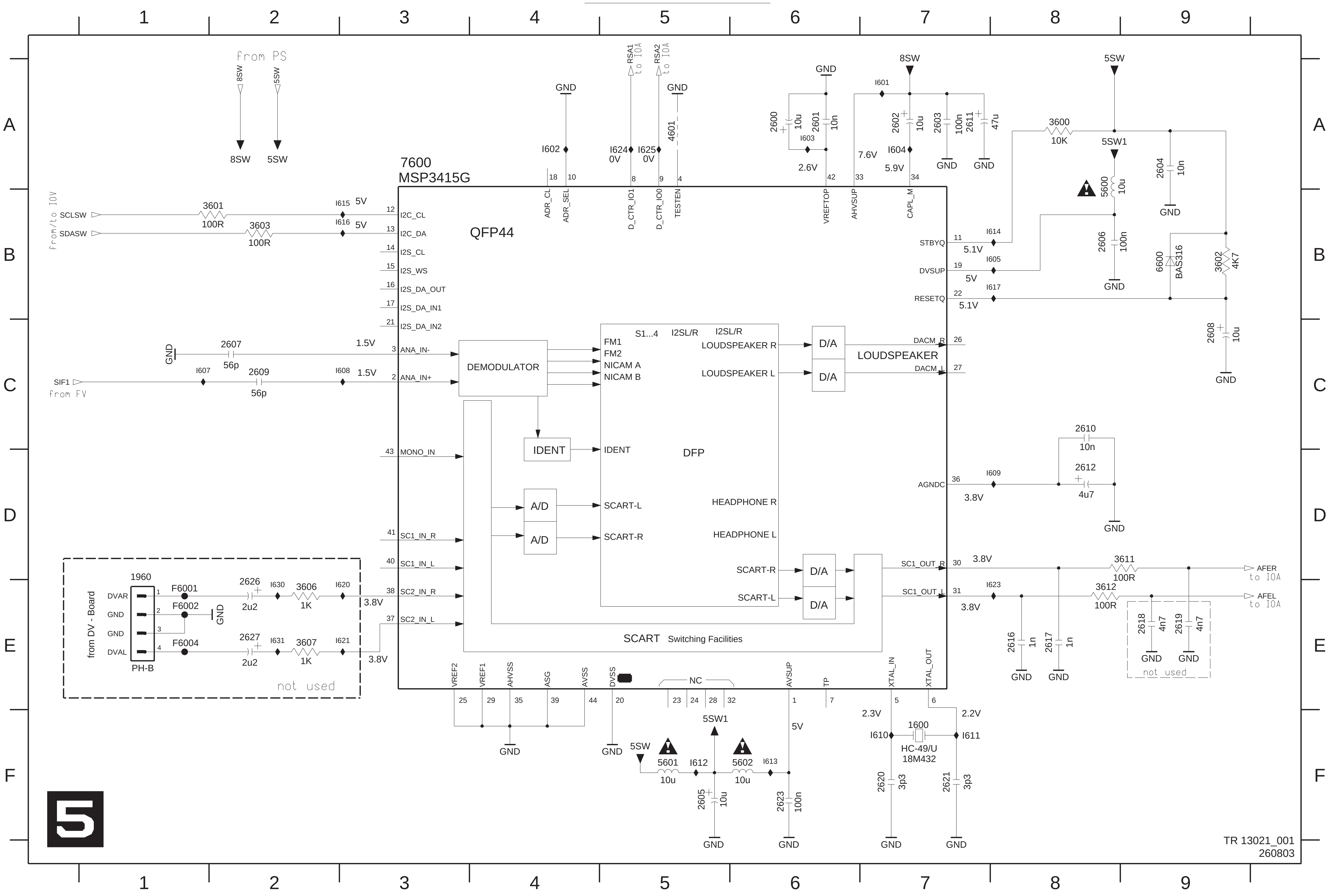
I325 VSource (no disc loaded)

A: DC, 50mV/Div
2us/Div

TR 13020_001
260803

1300	A2
1301	B2
1302	A3
1303	E9
1304	B9
1306	G13
1307	A12
1308	D13
1309	A13
1931	B1
1932	C1
1933	G1
1934	E1
1935	F1
1936	B3
2301	A7
2302	B2
2303	B4
2304	G9
2305	B8
2306	B9
2307	C5
2308	C6
2309	D4
2310	A11
2311	B11
2312	C8
2313	C9
2314	D6
2315	E4
2316	A8
2317	E4
2318	G6
2319	D9
2320	D9
2321	E11
2322	E9
2323	E10
2324	H4
2325	H5
2326	G11
2327	G12
2328	G10
2329	I6
2330	C11
2331	I4
2332	H14
2333	A8
2334	I10
2335	D10
2336	I8
2337	H3
2338	H12
2339	B10
2340	A3
2341	B10
2342	F4
2343	E11
3300	A6
3301	A6
3302	F11
3303	F11
3304	F11
3305	B3
3306	A4
3307	F11
3308	C5
3309	C5
3310	C5
3311	C10
3312	C10
3313	D12
3314	C12
3315	C12
3316	C12
3317	H6
3318	E3
3319	A7
3321	E4
3322	F10
3323	E12
3324	G4
3325	E11
3326	G12
3327	H13
3328	H8
3329	I13
3330	I6
3331	I7
3332	I7
3333	I7
3334	I7
3335	A10
3336	A10
3337	B10
3338	B10
3339	A12
3340	A12
3341	A12
3342	B12
3343	B12
3344	B12
3345	I7
3346	F8
3347	I3
3348	H10
3349	G11
3350	F11
3351	G4
3352	E5
3353	H11
3354	H12
3355	I10
3356	G5
3357	H7
3358	H8
3359	H9
3360	G5
3361	F12
3362	H10
3363	G8
3364	G8
3365	F4
3366	G5
3367	G5
3368	D11
3371	H11
3372	H11
3373	H11
3374	A13
3375	A13
3376	A13
3377	A13
3378	D11
4301	G12
4304	F2
5300	A6
5301	B13
5302	B4
5304	D6
5305	G9
5306	C8
5307	E10
5308	A9
5309	D9
6300	A8
6301	B4
6302	B5
6303	B8
6305	C4
6306	C5
6307	C8
6308	C8
6309	D5
6310	D8
6311	E5
6312	F8
6313	E8
6314	I10
6315	E8
6316	H5
6317	F10
6318	G12
6319	G9
6320	I10
6321	G4
6322	F12
6324	H12
6325	E10
7301	A11
7302	B10
7303	C11
7304	B11
7305	C11
7306	D12
7307	E4
7308	H13
7309	E11
7310	H8
7311	H8
7312	F12
7313	G3
7314	H5
7315	I6
7317	A11
7318	D10
7319	I11
7320	H14
7321	I10
7322	G12
9301	E10
9302	G2
9304	F10
9305	H12
C300	B8
F300	A12
F301	A13
F302	A13
F304	A8
F305	A7
F306	A6
F307	A6
F308	B1
F309	B2
F310	B3
F311	B2
F312	B7
F313	B1
F314	B2
F315	C7
F316	C9
F317	C9
F318	C9
F319	C8
F320	C7
F321	D12
F322	D13
F323	D7
F324	D13
F325	D13
F326	D8
F328	E3
F329	E8
F331	F13
F333	F13
F334	F10
F335	F10
F336	G9
F337	G9
F338	G6
F339	G9
F340	G12
F341	G13
F342	G3
F343	G12
F344	G14
F346	E13
F347	E13
F348	G2
F349	A13
F350	G1
F351	A14
F352	G2
F353	G1
F354	E12
F355	E12
F356	C9
F357	H2
F358	G2
F359	I9
F360	H1
F361	I6
F362	G11
F363	G11
F364	A12
F366	E8
F367	E9
F368	E9
F369	E9
F371	G13
F372	G13
F373	A12
F374	A13
F381	D1
F382	E14
F383	D1
F384	D1
I300	A6
I301	A12
I302	A7
I303	A8
I304	A10
I305	A11
I306	A3
I307	G4
I308	B8
I309	B12
I310	B8
I311	B9
I312	B5
I313	B10
I314	B4
I315	B11
I316	B5
I317	C4
I318	C12
I319	C10
I320	C11
I321	D6
I322	D6
I323	D12
I324	E3
I325	E5
I326	E10
I327	F11
I329	F11
I330	F3
I331	F4
I332	F8
I333	F11
I334	F12
I335	F6
I336	F8
I337	F10
I338	F11
I339	G8
I340	G5
I342	I12
I343	H6
I344	H6
I345	H8
I346	H13
I347	H11
I348	I3
I349	H10
I350	I6
I351	I7
I352	I11
I353	I14
I354	I13
I355	I7
I356	H12
I357	H11
I361	I8

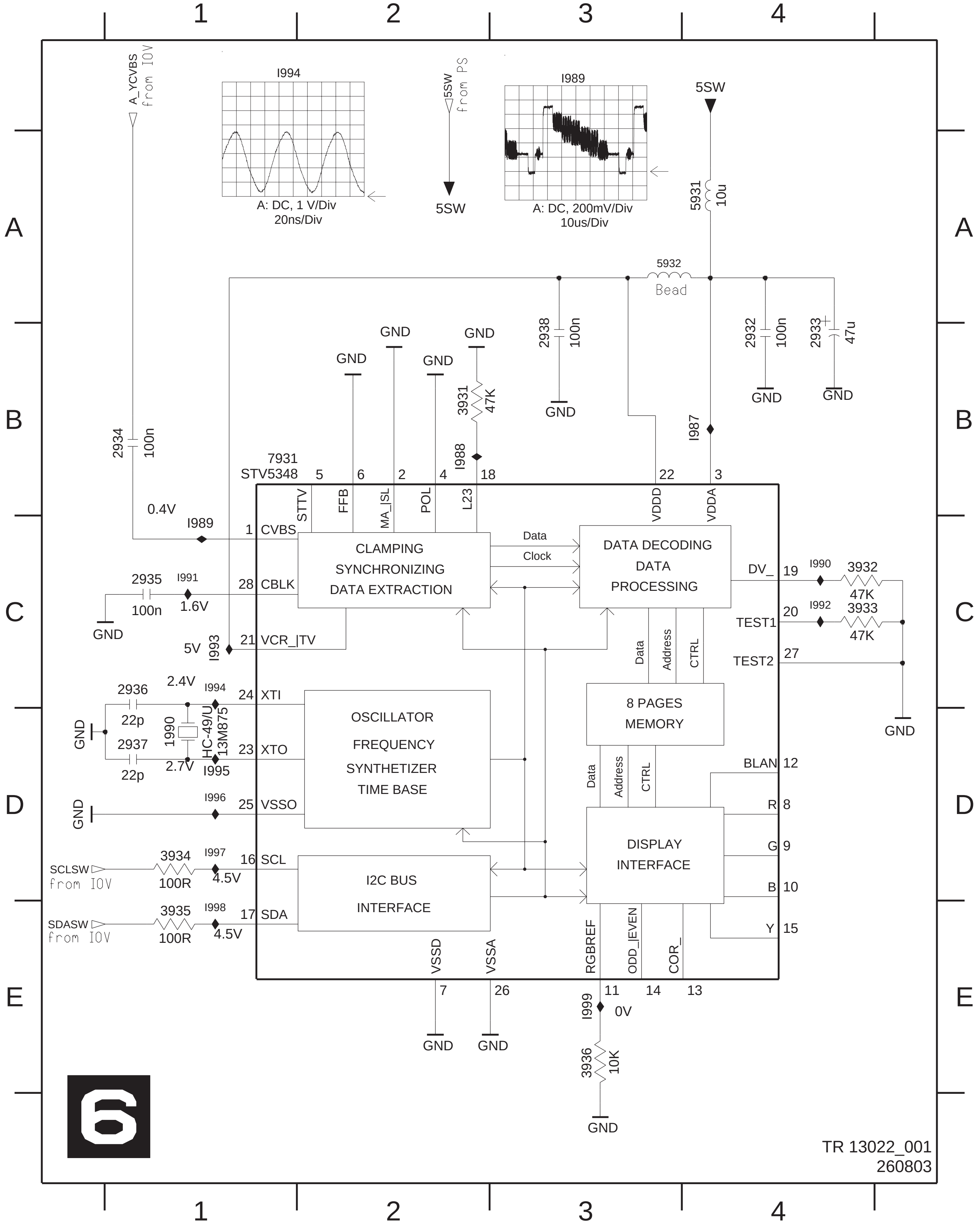
Analog Board: Multi Sound Processing (MSP)



1600	F7
1960	E1
2600	A6
2601	A6
2602	A7
2603	A7
2604	A9
2605	F5
2606	B8
2607	C2
2608	C9
2609	C2
2610	C8
2611	A7
2612	D8
2616	E8
2617	E8
2618	E9
2619	E9
2620	F7
2621	F7
2623	F6
2626	E2
2627	E2
3600	A8
3601	B2
3602	B9
3603	B2
3606	E2
3607	E2
3611	D9
3612	E8
4601	A5
5600	A8
5601	F5
5602	F6
6600	B9
7600	A3
F6001	E1
F6002	E1
F6004	E1
I601	A7
I602	A4
I603	A6
I604	A7
I605	B8
I607	C1
I608	C3
I609	D8
I610	F7
I611	F7
I612	F5
I613	F6
I614	B8
I615	B3
I616	B3
I617	B8
I620	E3
I621	E3
I623	E8
I624	A5
I625	A5
I630	E2
I631	E2

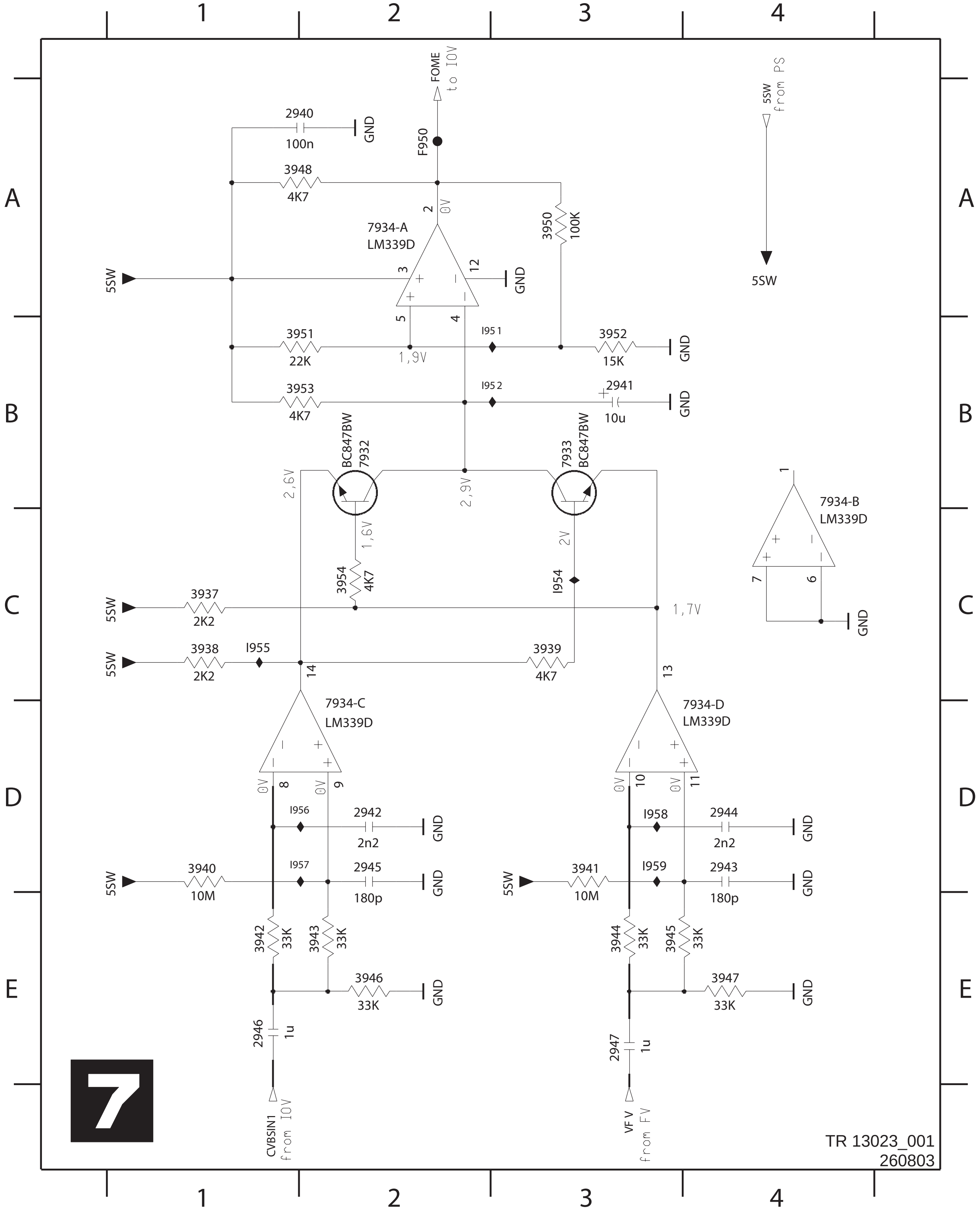
Analog Board: VPS

1990	D1
2932	B4
2933	B4
2934	B1
2935	C1
2936	C1
2937	D1
2938	B3
3931	B2
3932	C4
3933	C4
3934	D1
3935	E1
3936	E3
5931	A4
5932	A3
7931	B2
I987	B4
I988	B2
I989	C1
I990	C4
I991	C1
I992	C4
I993	C1
I994	C1
I995	D1
I996	D1
I997	D1
I998	E1
I999	E3



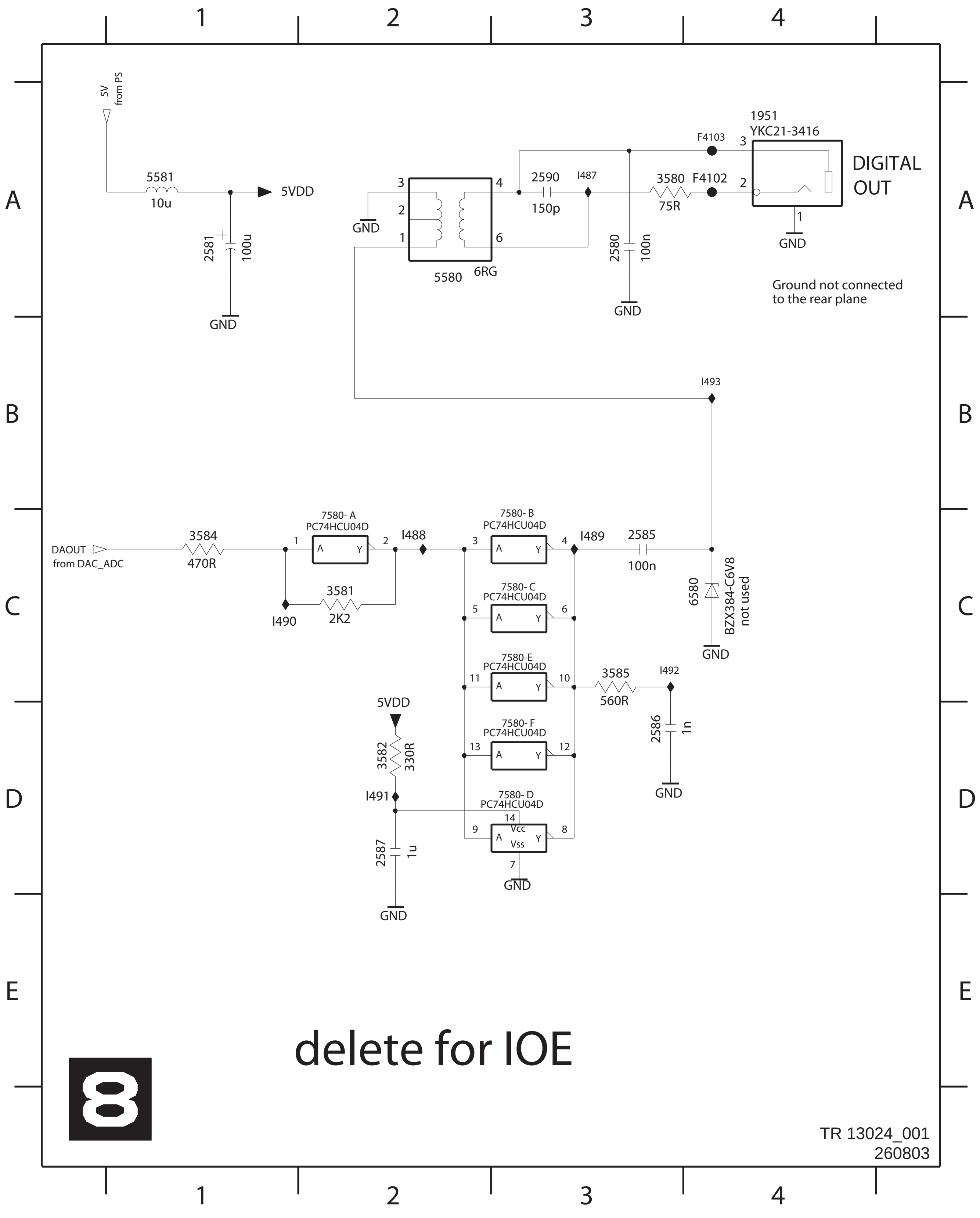
Analog Board: Follow Me (FOME)

2940	A2
2941	B3
2942	D2
2943	D4
2944	D4
2945	D2
2946	E1
2947	E3
3937	C1
3938	C1
3939	C3
3940	D1
3941	D3
3942	E1
3943	E2
3944	E3
3945	E3
3946	E2
3947	E4
3948	A2
3950	A3
3951	B2
3952	B3
3953	B2
3954	C2
7932	B2
7933	B3
7934-A	A2
7934-B	B4
7934-C	C2
7934-D	C3
F950	A2
I951	B3
I952	B3
I954	C3
I955	C1
I956	D2
I957	D2
I958	D3
I959	D3



Analog Board: Digital In / Out (DIGIO)

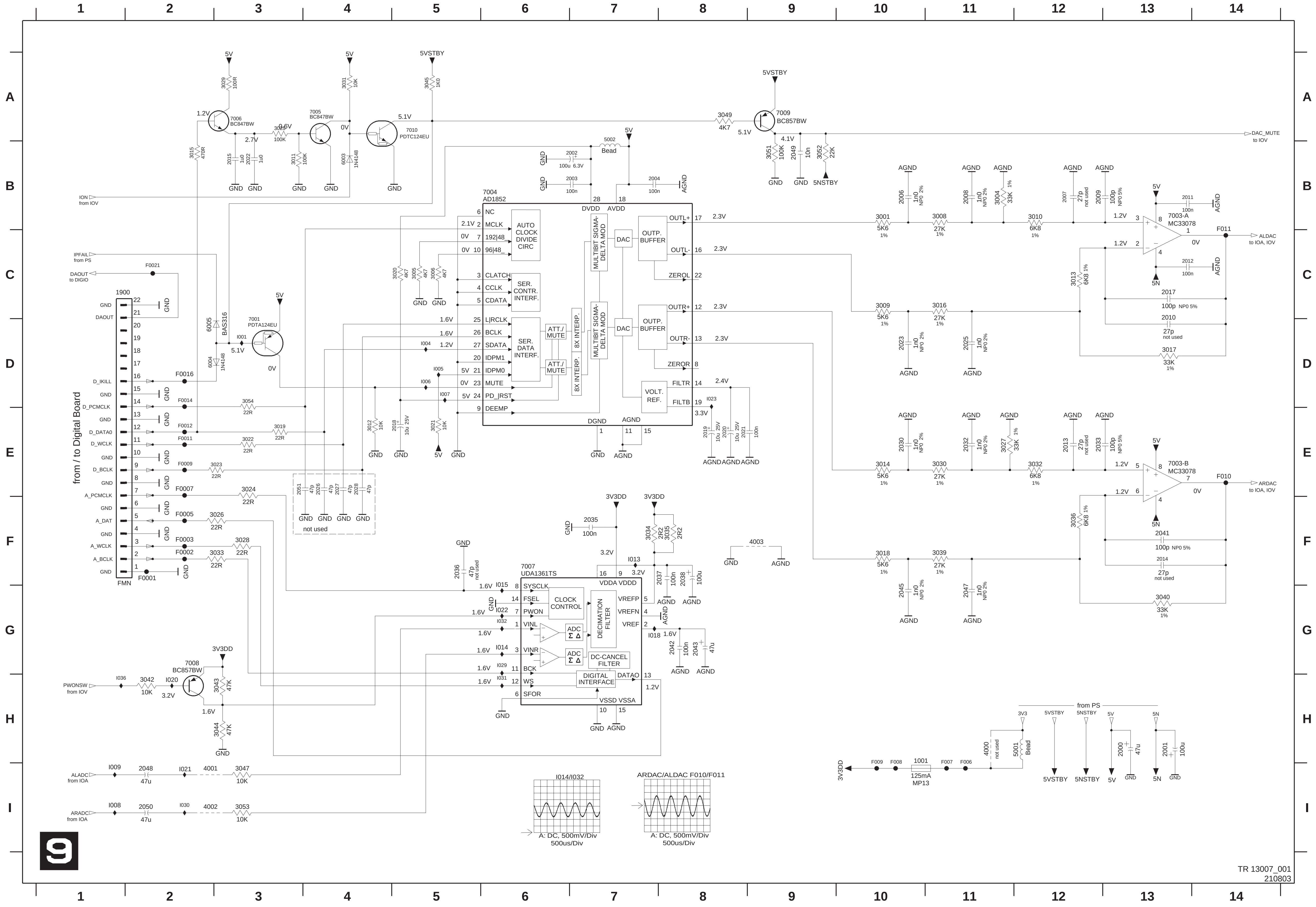
1951	A4
2580	A3
2581	A1
2585	C3
2586	D3
2587	D2
2590	A3
3580	A3
3581	C2
3582	D2
3584	C1
3585	C3
5580	A2
5581	A1
6580	C4
7580-A	C2
7580-B	C3
7580-C	C3
7580-D	D3
7580-E	C3
7580-F	D3
F4102	A4
F4103	A4
I487	A3
I488	C2
I489	C3
I490	C1
I491	D2
I492	C3
I493	B4



delete for IOE

TR 13024_001
260803

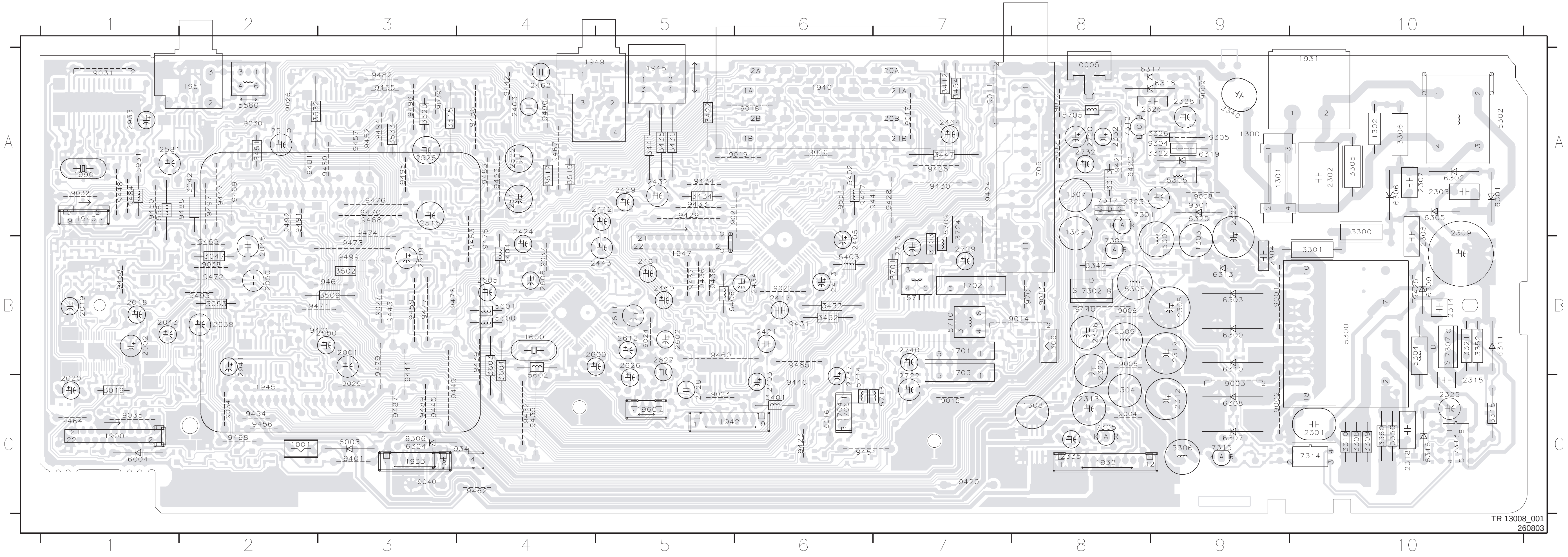
Analog Board: Audio Converter (DAC_ADC)



1001 H10	
1900 C2	
2000 H13	
2001 H13	
2002 B7	
2003 B7	
2004 B7	
2006 B10	
2007 B12	
2008 B11	
2009 B12	
2010 D13	
2011 B13	
2012 C13	
2013 E12	
2014 F13	
2015 B3	
2017 C13	
2018 E5	
2019 E8	
2020 E8	
2021 E8	
2022 B3	
2023 D10	
2025 D11	
2026 E4	
2027 E4	
2028 E4	
2030 E10	
2032 E11	
2033 E12	
2035 F7	
2036 F5	
2037 F7	
2038 F8	
2041 F13	
2042 G8	
2043 G8	
2045 G10	
2047 G11	
2048 I2	
2049 B9	
2050 I2	
2051 E3	
3001 B10	
3004 B11	
3005 C5	
3006 C5	
3008 B11	
3009 C10	
3010 B12	
3011 B3	
3012 E4	
3013 C12	
3014 E10	
3015 B2	
3016 C11	
3017 D13	
3018 F10	
3019 E3	
3020 C5	
3021 E5	
3022 E3	
3023 E3	
3024 E3	
3025 A3	
3026 F3	
3027 E11	
3028 F3	
3029 A3	
3030 E11	
3031 A4	
3032 E12	
3033 F3	
3034 F7	
3035 F8	
3036 F12	
3039 F11	
3040 G13	
3042 H2	
3043 H3	
3044 H3	
3045 A5	
3047 I3	
3049 A8	
3051 B9	
3052 B9	
3053 I3	
3054 D3	
4000 H11	
4001 I2	
4002 I2	
4003 F9	
5001 H12	
5002 B7	
6003 B4	
6004 D2	
6005 D2	
7001 C3	
7003-A B13	
7003-B E13	
7004 B6	
7005 A4	
7006 A3	
7007 F6	
7008 G2	
7009 A9	
7010 A5	
F0001 F2	
F0002 F2	
F0003 F2	
F0005 F2	
F0007 E2	
F0009 E2	
F0011 E2	
	F0012 E2
	F0014 D2
	F0016 D2
	F0021 C2
	F006 I11
	F007 I11
	F008 I10
	F009 I10
	F010 E14
	F011 C14
	I001 D3
	I004 D5
	I005 D5
	I006 D5
	I007 D5
	I008 I1
	I009 I1
	I013 F7
	I014 G6
	I015 F6
	I018 G7
	I020 H2
	I021 I2
	I022 G6
	I023 D8
	I029 G6
	I030 I2
	I031 H6
	I032 G6
	I036 H1

Layout Analog Board (Top View)

0005	A8
1001	C2
1300	A9
1301	A9
1302	A10
1303	B9
1304	C8
1306	B8
1307	A8
1308	C8
1309	A8
1600	B4
1701	B7
1702	B7
1703	B7
1704	C6
1705	A8
1706	C6
1900	C1
1931	A10
1932	C8
1933	C3
1934	C4
1940	A6
1942	C5
1943	A1
1945	C2
1947	B5
1948	A5
1949	A4
1951	A2
1960	C5
1990	A1
2000	B3
2001	B3
2002	B1
2018	B1
2019	B1
2020	C1
2038	B2
2043	B1
2048	B2
2050	B2
2301	C10
2302	A10
2303	A10
2304	B9
2305	B9
2306	B8
2307	A10
2308	B10
2309	A10
2312	C9
2313	C8
2314	B10
2315	C10
2318	C10
2319	B9
2320	B8
2322	A9
2323	A8
2325	C10
2326	A9
2328	A9
2332	A8
2335	C8
2340	A9
2403	C6
2405	B6
2413	B6
2417	B6
2421	B6
2424	A4
2428	C5
2429	A5
2432	A5
2434	B6
2442	A5
2443	B5
2460	B5
2461	B5
2462	A4
2463	A4
2464	A7
2510	A2
2511	A4
2516	A3
2519	B3
2522	A4
2526	A3
2581	A1
2600	B5
2602	B5
2605	B4
2608	B4
2611	B5
2612	B5
2626	B5
2627	B5
2713	B7
2720	A8
2722	C7
2729	B7
2732	A8
2737	C6
2740	B7
2933	A1
2941	B2
3019	C1
3042	A2
3047	B2
3053	B2
3300	A10
3301	B10
3305	A10
3306	A10
3308	C10
3309	C10
3310	C10
3313	A8
3318	C10
3321	B10
3322	A9
3326	A9
3342	B8
3352	B10
3356	C10
3360	C10
3412	A7
3422	A5
3432	B6
3433	B6
3434	A5
3435	A5
3436	A5
3441	A5
3447	A7
3451	A2
3454	A7
3502	B3
3509	B3
3515	A3
3517	A4
3519	A4
3523	A3
3532	A2
3533	A3
3601	B4
3603	B4
3701	B7
3703	B7
3724	A7
5300	B10
5302	A10
5304	B10
5305	A9
5306	C9
5307	B9
5308	B8
5309	B8
5401	C6
5402	A6
5403	B6
5404	B4
5406	B5
5580	A2
5581	A1
5600	B4
5601	B4
5602	C4
5705	A8
5709	A7
5710	B7
5711	B7
5713	C7
5714	C6
5931	A1
6003	C3
6004	C1
6300	B9
6301	A10
6302	A10
6303	B9
6304	C3
6305	A10
6306	A10
6307	C9
6308	C9
6309	B10
6310	B9
6311	B10
6313	B9
6316	C10
6317	A8
6318	A9
6319	A9
6325	A9
7301	A8
7302	B8
7304	B8
7305	C8
7307	B10
7312	A8
7313	C10
7314	C10
7315	C9
7317	A8
9001	B9
9002	C9
9003	C9
9004	C8
9005	B8
9006	B8
9008	A9
9009	A9
9010	A8
9011	A7
9012	A8
9013	B8
9014	B8
9015	C7
9016	C6
9017	A7
9018	A6
9019	A6
9020	A6
9021	A5
9022	B6
9023	C5
9024	B5
9026	A2
9027	B3
9029	C3
9030	A2
9031	A1
9032	A1
9034	C2
9035	C1
9037	B4
9038	B2
9039	A3
9040	C3
9301	A9
9304	A9
9305	A9
9306	C3
9401	C3
9420	C7
9421	A8
9422	A8
9423	C6
9424	A7
9425	B10
9426	A7
9427	A6
9428	A7
9429	A5
9430	A7
9431	B6
9432	C4
9433	A5
9434	A5
9435	C4
9436	B5
9437	B5
9438	B5
9439	B4
9440	B8
9441	A6
9442	A4
9443	B3
9444	B3
9445	C3
9446	C6
9447	A2
9448	A1
9449	C3
9450	A1
9451	C6
9452	A3
9453	A4
9454	C2
9455	A3
9456	C2
9457	A3
9458	B1
9459	B3
9460	B5
9461	B3
9462	C4
9463	B4
9464	C1
9465	B2
9466	B3
9467	A4
9468	A3
9469	A2
9470	A3
9471	B3
9472	B2
9473	B3
9474	A3
9475	B4
9476	A3
9477	B3
9478	B3
9479	B3
9480	A3
9481	A2
9482	A3
9483	A4
9484	A1
9485	B6
9486	A4
9487	C3
9488	A2
9489	C3
9490	A4
9491	A2
9492	A2
9493	B2
9494	A3
9495	A3
9496	A3
9497	A2
9498	C2
9499	B3
9551	A6
9701	B8



Layout Analog Board (Overview Bottom View)

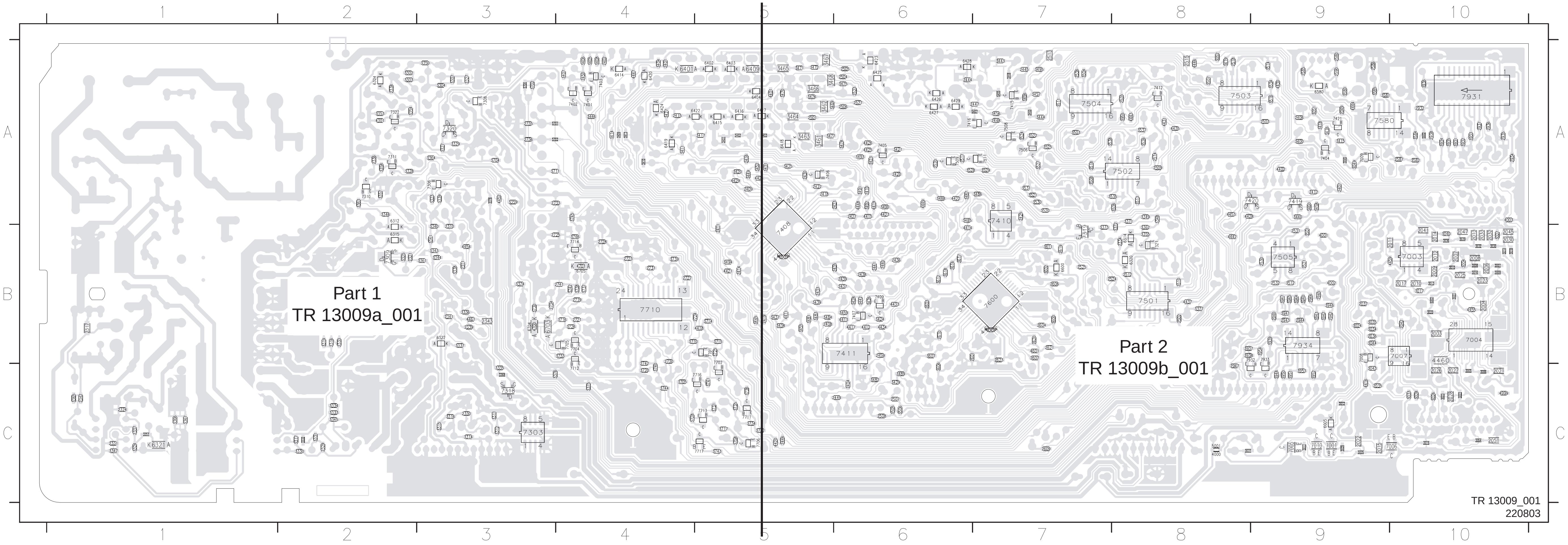
2003	B10	2036	B9	2341	B3	2433	B5	2509	A8
2004	B10	2037	B9	2342	C1	2435	B6	2512	B8
2006	B10	2041	B10	2343	B3	2436	B6	2513	A7
2007	B10	2042	B10	2401	A4	2437	B6	2514	A8
2008	B10	2045	B10	2402	A4	2438	B6	2515	A8
2009	B10	2047	B10	2404	C6	2439	B6	2517	A6
2010	B10	2049	A9	2406	A9	2440	B6	2518	A8
2011	B10	2051	C10	2407	A9	2441	B6	2520	A6
2012	B10	2310	B3	2408	B5	2444	A6	2521	B9
2013	B10	2311	B3	2409	A5	2445	A7	2523	A6
2014	B10	2316	B2	2410	A6	2446	C5	2524	B8
2015	C9	2317	B1	2411	B5	2447	A7	2525	B7
2017	B10	2321	B2	2412	A9	2448	A7	2527	A6
2021	C10	2324	C1	2414	B5	2449	C6	2530	B9
2022	C9	2327	A3	2415	A4	2450	A4	2531	B9
2023	B10	2329	C2	2416	A5	2459	B6	2532	B9
2025	B10	2330	C3	2418	A5	2501	A5	2535	A8
2026	C10	2331	C1	2419	B5	2502	B8	2536	A7
2027	C10	2333	B2	2420	A6	2503	A9	2580	A9
2028	C10	2334	B8	2422	A5	2504	A6	2585	A9
2030	B10	2336	A2	2423	A6	2505	A6	2586	A9
2032	B10	2337	C1	2425	A7	2506	A6	2587	A10
2033	B10	2338	A2	2427	A6	2507	C6	2590	A9
2035	C9	2339	B3	2430	A5	2508	C6	2601	B6

2603	B6	2735	A3	3011	C9	3036	B10	3327	A3
2604	B7	2736	A3	3012	C9	3039	B10	3328	A2
2606	B7	2741	B4	3013	B10	3040	B10	3329	A3
2607	B7	2742	B4	3014	B10	3043	C9	3330	C2
2609	C7	2932	A10	3015	C10	3044	B9	3331	C2
2610	B6	2934	A10	3016	B10	3045	A9	3332	C2
2616	B6	2935	A10	3017	B10	3049	A9	3333	C2
2617	B6	2936	A10	3018	B10	3051	A9	3334	C2
2618	B6	2937	A10	3020	B10	3052	A8	3335	C3
2619	B7	2938	A10	3021	B10	3054	C10	3336	B3
2620	B7	2940	B9	3022	C10	3302	A2	3337	B3
2621	B7	2942	B9	3023	C10	3303	A2	3338	B3
2623	B7	2943	B9	3024	B9	3304	A3	3339	A3
2719	B4	2944	B9	3025	C9	3307	A3	3340	B3
2721	B4	2945	B9	3026	C10	3311	C3	3341	B3
2723	B4	2946	B9	3027	B10	3312	C3	3343	B3
2724	B5	2947	C8	3028	C10	3314	C3	3344	B3
2725	B3	3001	B10	3029	C9	3315	C3	3345	C2
2727	B4	3004	B10	3030	B10	3316	C3	3346	A2
2728	B4	3005	C10	3031	C8	3317	C2	3347	C1
2730	B4	3006	C10	3032	B10	3319	B2	3348	A8
2731	B4	3008	B10	3033	C10	3323	A3	3349	A8
2733	A3	3009	B10	3034	B9	3324	C1	3350	A3
2734	B3	3010	B10	3035	B9	3325	B2	3351	C1

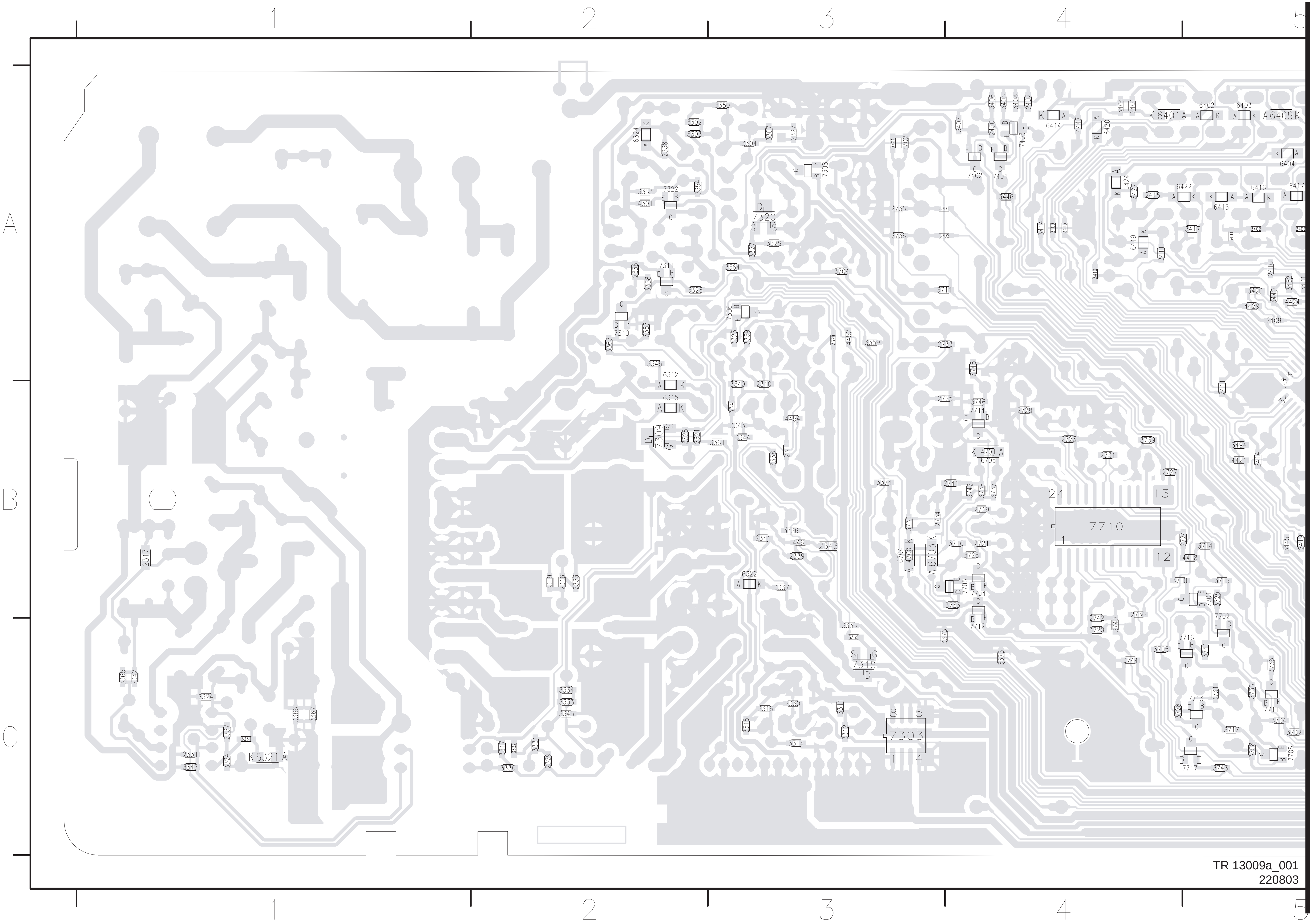
3353	A2	3402	A5	3428	B6	3463	A5	3491	A6
3354	A2	3403	A5	3429	C6	3464	A5	3492	A6
3355	B8	3404	A4	3431	A5	3465	A5	3493	A6
3357	A2	3405	A4	3437	B5	3466	A5	3494	B5
3358	A2	3406	A4	3438	B5	3467	A5	3495	A7
3359	A3	3407	A4	3439	B5	3468	A5	3496	A7
3361	B3	3408	A4	3440	A9	3469	A5	3501	B9
3362	B8	3409	A4	3442	B6	3470	A5	3503	A7
3363	A2	3410	A4	3443	A7	3471	A5	3504	A7
3364	A3	3411	A4	3444	A7	3472	A5	3505	C6
3365	C1	3413	A4	3445	B5	3475	A6	3506	C6
3366	C1	3414	A4	3446	A4	3476	A5	3507	A8
3367	C1	3415	A9	3448	A7	3477	A5	3508	A7
3368	C3	3416	A9	3449	A5	3478	A6	3510	B8
3371	A8	3417	A5	3450	A7	3481	B5	3511	A7
3372	B8	3418	A9	3452	A5	3482	C6	3512	B9
3373	B7	3419	A8	3455	B5	3483	B5	3513	A8
3374	B3	3420	A5	3456	A7	3484	B5	3514	A9
3375	C4	3421	A6	3457	A7	3485	A6	3516	A9
3376	C3	3423	A6	3458	A9	3486	A7	3518	A7
3377	B8	3424	B6	3459	B6	3487	A6	3520	A7
3378	A3	3425	A5	3460	A9	3488	A6	3521	A7
3400	A9	3426	B6	3461	A5	3489	C6	3522	A7
3401	A5	3427	A4	3462	A5	3490	A6	3524	A7

3525	A7	3704	A3	3742	B4	3950	C9	4422	A6
3526	A8	3705	C4	3743	C5	3951	C9	4423	A6
3527	A7	3710	B4	3744	C4	3952	C9	4424	A5
3528	A6	3711	A3	3745	A4	3953	C9	4425	A6
3529	A7	3714	B5	3746	B4	3954	B9	4426	A6
3530	A7	3715	B5	3758	C5	3955	A8	4428	A8
3531	A7	3716	B4	3931	A10	4000	C8	4429	A5
3534	A9	3717	C5	3932	A10	4001	B9	4430	A9
3535	A8	3720	C4	3933	A10	4002	B9	4431	A8
3536	A8	3725	B5	3934	A10	4003	A10	4433	B6
3537	A8	3726	B4	3935	A10	4301	A2	4434	B6
3538	A7	3728	C4	3936	A10	4401	A5	4435	A8
3580	A9	3730	B3	3937	B8	4402	A9	4437	B8
3581	A9	3731	C5	3938	B8	4411	B5	4442	B8
3582	A10	3732	C5	3939	B9	4412	B6	4443	A8
3584	A10	3733	B4	3940	B9	4413	B6	4444	A9
3585	A9	3734	C5	3941	B9	4414	B6	4446	A8
3600	B7	3735	C5	3942	B9	4415	A6	4447	A4
3602	B7	3736	C5	3943	B9	4416	C9	4448	A6
3606	C6	3737	B4	3944	B9	4417	B6	4449	A6
3607	B6	3738	B4	3945	B9	4418	B5	4452	A3
3611	B7	3739	B4	3946	B9	4419	A6	4453	A8
3612	B6	3740	C4	3947	B9	4420	C5	4454	B3
3702	A3	3741	C5	3948	C9	4421	B5	4455	B10

4459	B10	6402	A5	7001	C9	7405	A6	7701	B5
4460	B10	6403	A5	7003	B10	7406	A5	7702	B5
4461	B3	6404	A5	7004	B10	7407	B6	7704	B4
4601	B7	6409	A5	7005	C9	7408	B5	7705	B4
4700	B3	6414	A4	7006	C10	7409	B6	7706	C5
4701	B4	6415	A5	7007	B10	7410	A7	7710	B4
4999	C10	6416	A5	7008	B9	7411	B6	7711	C5
5001	C8	6417	A5	7009	A9	7412	A8	7712	C4
5002	B10	6418	A5	7010	C9	7415	A7	7713	C5
5405	A7	6419	A4	7303	C3	7416	A6	7714	B4
5407	A7	6420	A4	7306	A3	7419	A9	7716	C5
5701	A3	6422	A5	7308	A3	7420	A9	7717	C5
5702	A3	6423	A6	7309	B2	7421	A9	7931	A10
5704	A3	6424	A4	7310	A2	7501	B8	7932	B8
5932	A10	6425	A6	7311	A2	7502	A8	7933	B9
6005	C9	6426	A6	7318	C3	7503	A8	7934	B9
6312	A2	6427	A6	7319	B7	7504	A7		
6314	B8	6428	A6	7320	A3	7505	B9		
6315	B2	6429	A6	7321	B8	7506	A7		
6320	B8	6580	A9	7322	A2	7508	A7		
6321	C1	6600	B7	7401	A4	7509	A6		
6322	B3	6703	B3	7402	A4	7511	A7		
6324	A2	6704	B3	7403	A4	7580	A9		
6401	A4	6705	B4	7404	A9	7600	B7		

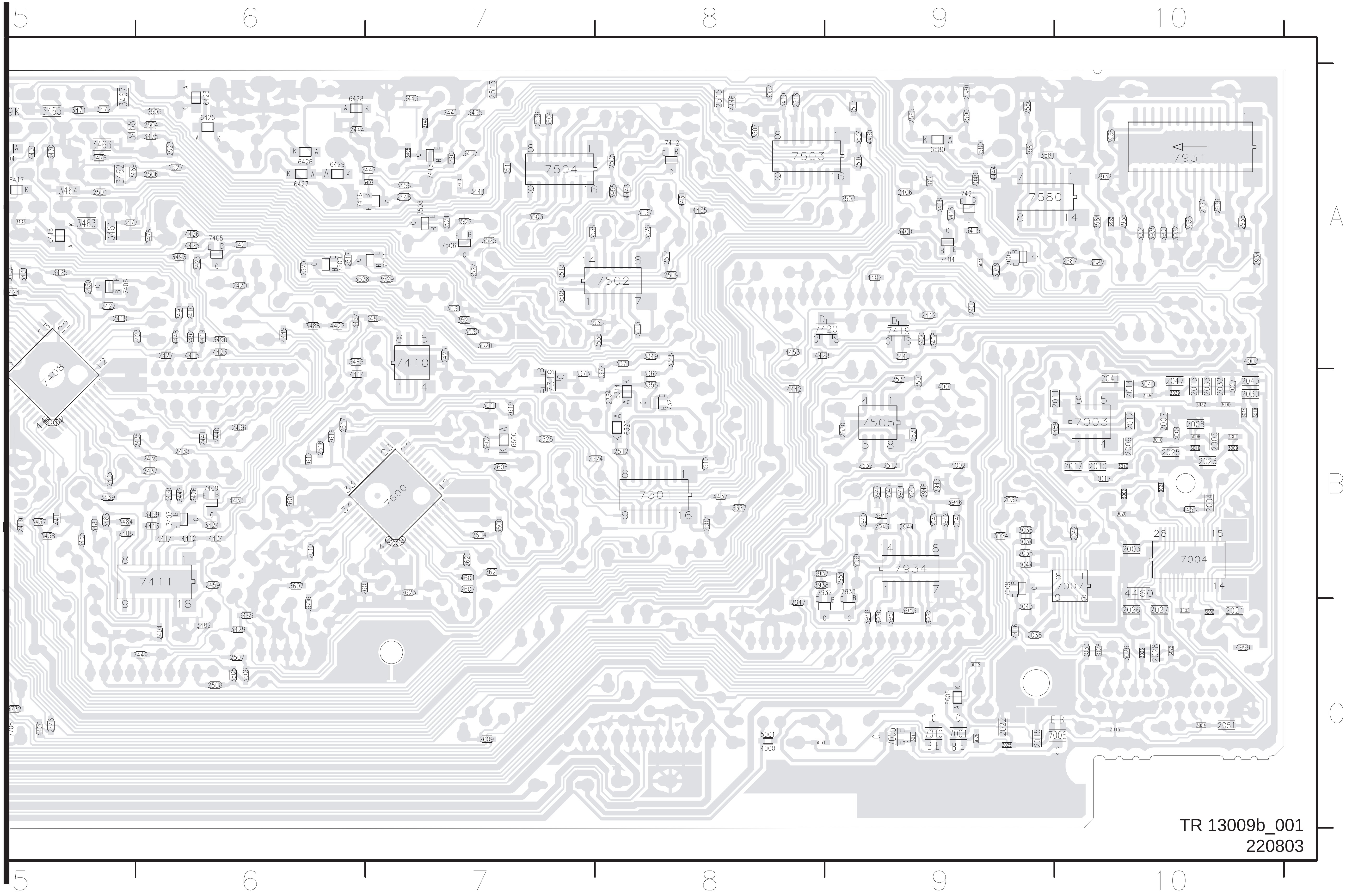


Layout Analog Board (Part 1 Bottom View)



TR 13009a_001
220803

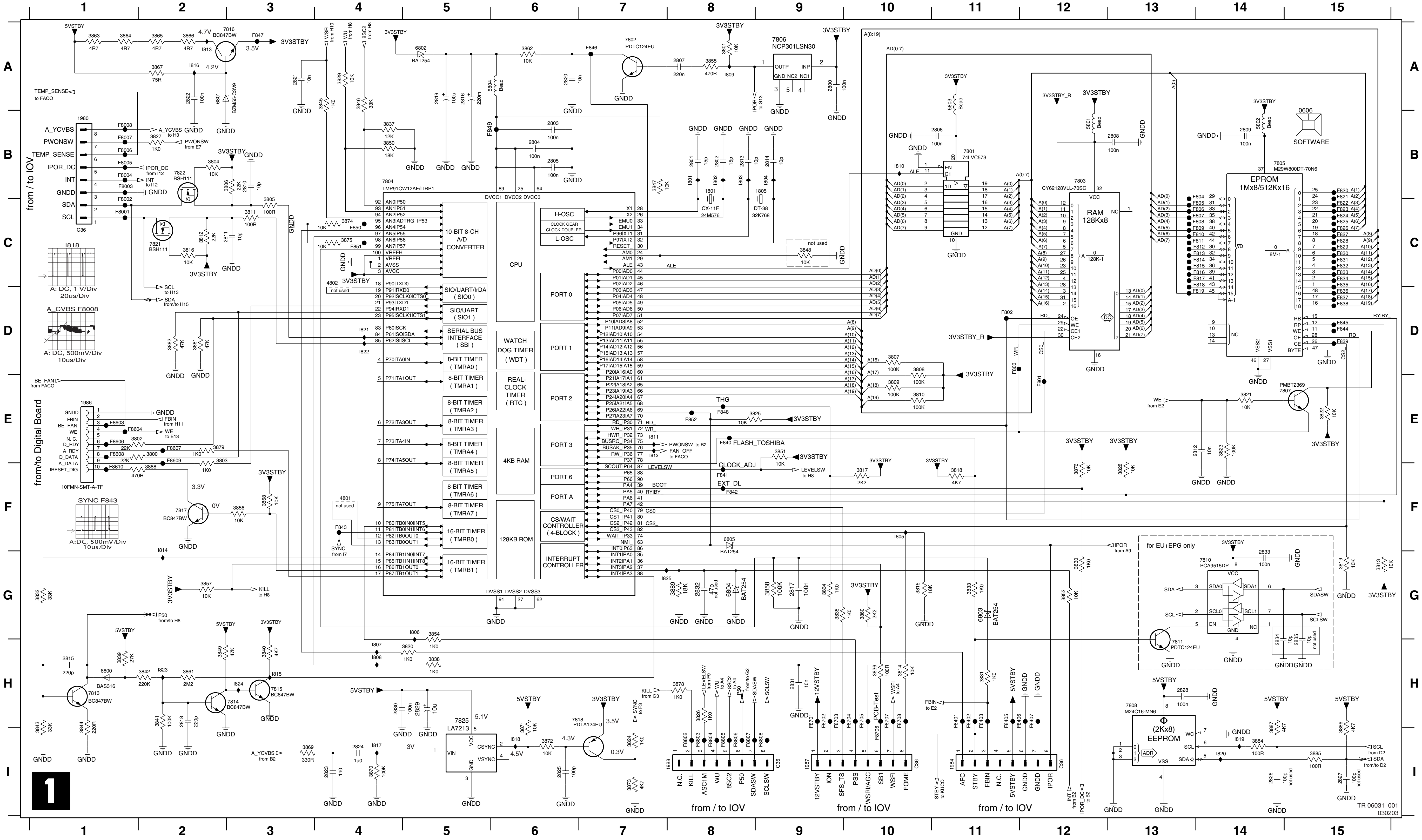
Layout Analog Board (Part 2 Bottom View)



TR 13009b_001
220803

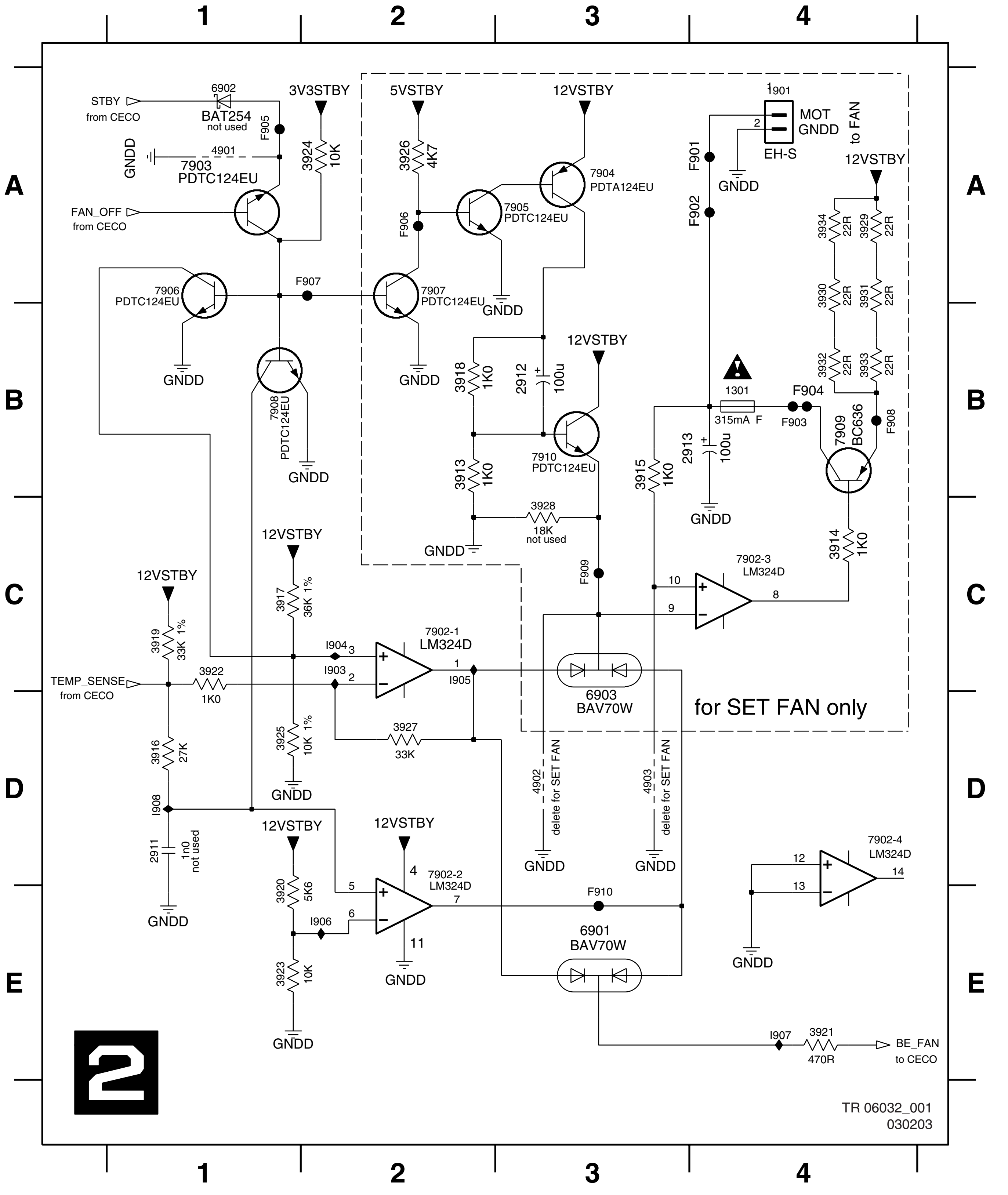
UP Sub Board: Central Controller (CECO)

0606	B15
1801	B8
1805	B9
1980	B1
1984	I11
1986	E1
1987	I9
1988	I8
2800	A9
2801	B8
2802	B8
2803	B6
2804	B6
2805	B6
2806	B11
2807	A8
2808	B13
2809	B14
2810	B3
2811	C3
2812	E14
2813	B8
2814	B9
2815	H1
2816	A5
2817	G9
2818	H2
2819	A5
2820	A6
2821	A3
2822	A2
2823	I4
2824	I4
2825	I6
2826	I14
2827	I15
2828	H13
2829	H5
2830	H4
2831	H9
2832	G8
2833	G14
2834	H14
2835	H15
3800	E2
3801	A8
3802	E1
3803	E2
3804	B2
3805	C3
3806	B3
3807	D10
3808	D10
3809	E10
3810	E10
3811	C3
3812	C2
3813	G15
3814	H10
3815	G10
3816	C2
3817	F10
3818	F11
3819	G15
3820	H5
3821	E14
3822	E15
3823	E14
3824	I7
3825	E8
3826	H8
3827	B2
3828	F13
3829	A4
3830	G12
3831	H11
3832	G1
3833	G11
3834	G9
3835	G9
3836	H10
3837	B4
3838	H5
3839	H1
3840	H3
3841	H2
3842	H2
3843	I1
3844	I1
3845	A4
3846	A4
3847	B7
3848	C9
3849	H2
3850	B4
3851	E9
3852	G12
3854	G5
3855	A8
3856	F3
3857	G2
3858	G9
3860	G10
3861	H2
3862	A6
3863	A1
3864	A1
3865	A2
3866	A2
3867	A2
3868	F3
3869	I3
3870	I4
3871	I6
3872	I6
3873	I7
3874	C4
3875	C4
3876	F12
3878	H8
3879	E2
3881	D2
3882	D2
3884	I14
3885	I15
3886	I15
3887	I14
3888	F2
3889	G8
4801	F4
4802	C4
5801	B12
5802	B14
5803	A11
5804	A6
6800	H1
6801	A2
6802	A5
6803	G11
6804	G8
6805	F8
7801	B11
7802	A7
7803	B12
7804	B4
7805	B14
7806	A9
7807	E15
7808	H13
7810	G14
7811	H13
7813	H1
7814	H3
7815	H3
7816	A3
7817	F2
7818	H6
7821	C2
7822	B2
7825	H5
F8001	C1
F8002	C1
F8003	B1
F8004	B1
F8005	B1
F8006	B1
F8007	B1
F8008	B1
F801	E12
F802	D11
F803	D11
F804	B14
F805	C14
F806	C14
F807	C14
F808	C14
F809	C14
F810	C14
F811	C14
F812	C14
F813	C14
F814	C14
F815	C14
F816	C14
F817	C14
F818	C14
F819	D14
F820	B15
F821	B15
F822	C15
F823	C15
F824	C15
F825	C15
F826	C15
F827	C15
F828	C15
F829	C15
F830	C15
F831	C15
F832	C15
F833	C15
F834	C15
F835	C15
F836	D15
F837	D15
F838	D15
F839	D15
F840	E8
F8401	H11
F8402	H11
F8403	H11
F8405	H11
F8406	H12
F8407	H12
F841	F8
F842	F8
F843	F4
F844	D15
F845	D15
F846	A7
F847	A3
F848	E8
F849	B6
F850	C4
F851	C4
F852	E8
F8603	E1
F8604	E1
F8606	E1
F8607	E2
F8608	E1
F8609	E2
F8610	F1
F8701	H9
F8702	H9
F8703	H9
F8704	H10
F8705	H10
F8706	I10
F8707	H10
F8708	H10
F8802	I8
F8803	I8
F8804	I8
F8805	I8
F8806	I8
F8807	I8
F8808	I9
I801	B8
I802	B8
I803	B8
I804	B9
I805	F10
I806	G5
I807	H4
I808	H4
I809	A8
I810	B10
I811	E7
I812	E7
I813	A2
I814	F2
I815	H3
I816	A2
I817	I4
I818	I6
I819	I14
I820	I14
I821	D4
I822	D4
I823	H2
I824	H3
I825	G7

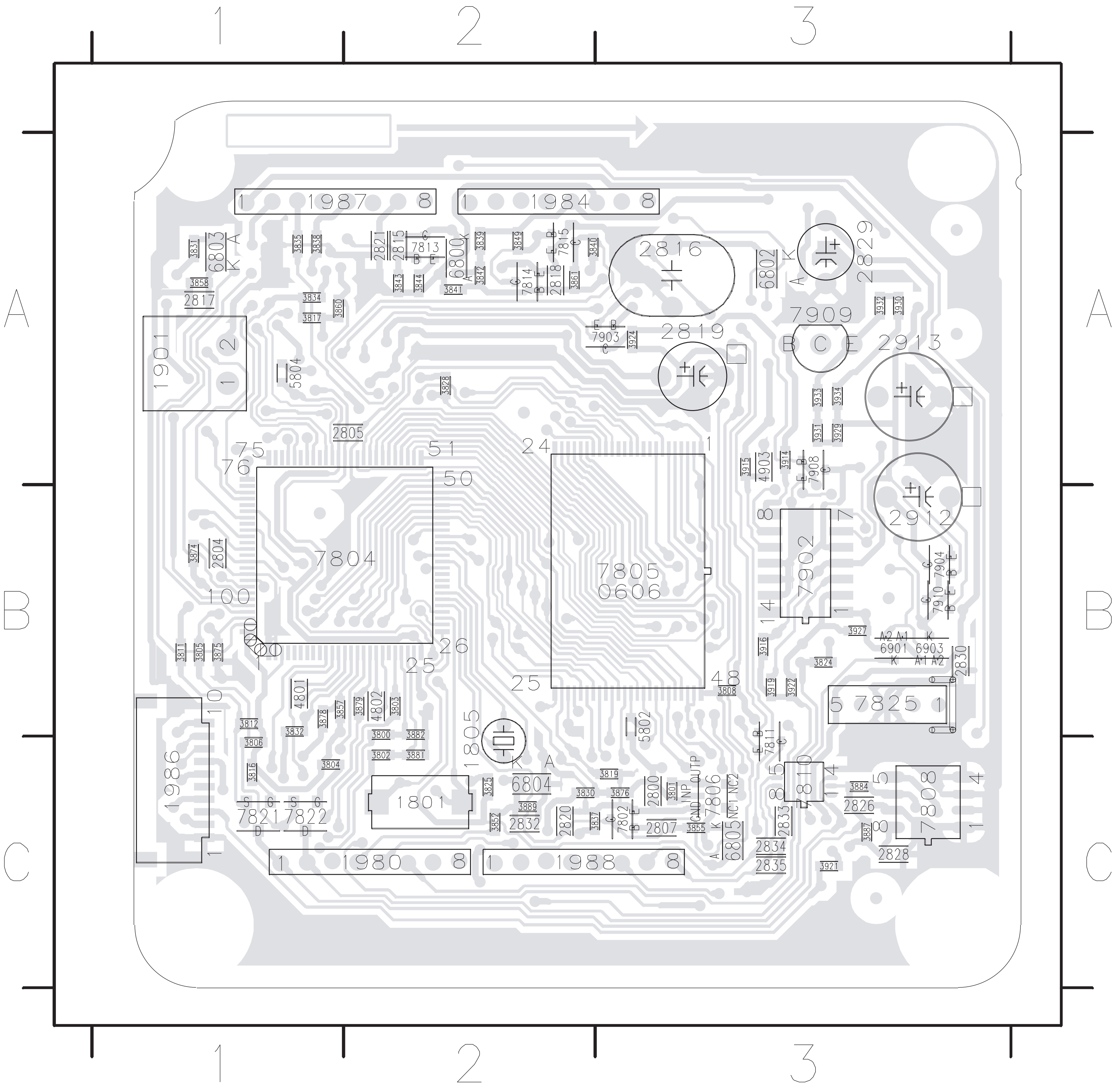


UP Sub Board: Fan Control (FACO)

1301 B4	3915 B3	3922 C1	3929 A4	4902 D3	7902-3 C4	7908 B1	F905 A1	I904 C2
1901 A4	3916 D1	3923 E1	3930 A4	4903 D3	7902-4 D4	7909 B4	F906 A2	I905 C2
2911 D1	3917 C1	3924 A2	3931 A4	6901 E3	7903 A1	7910 B3	F907 A2	I906 E2
2912 B3	3918 B2	3925 D1	3932 B4	6902 A1	7904 A3	F901 A4	F908 B4	I907 E4
2913 B4	3919 C1	3926 A2	3933 B4	6903 C3	7905 A3	F902 A4	F909 C3	I908 D1
3913 B2	3920 E1	3927 D2	3934 A4	7902-1 C2	7906 A1	F903 B4	F910 E3	
3914 C4	3921 E4	3928 C3	4901 A1	7902-2 D2	7907 A2	F904 B4	I903 C2	



Layout UP Sub Board (Top View)

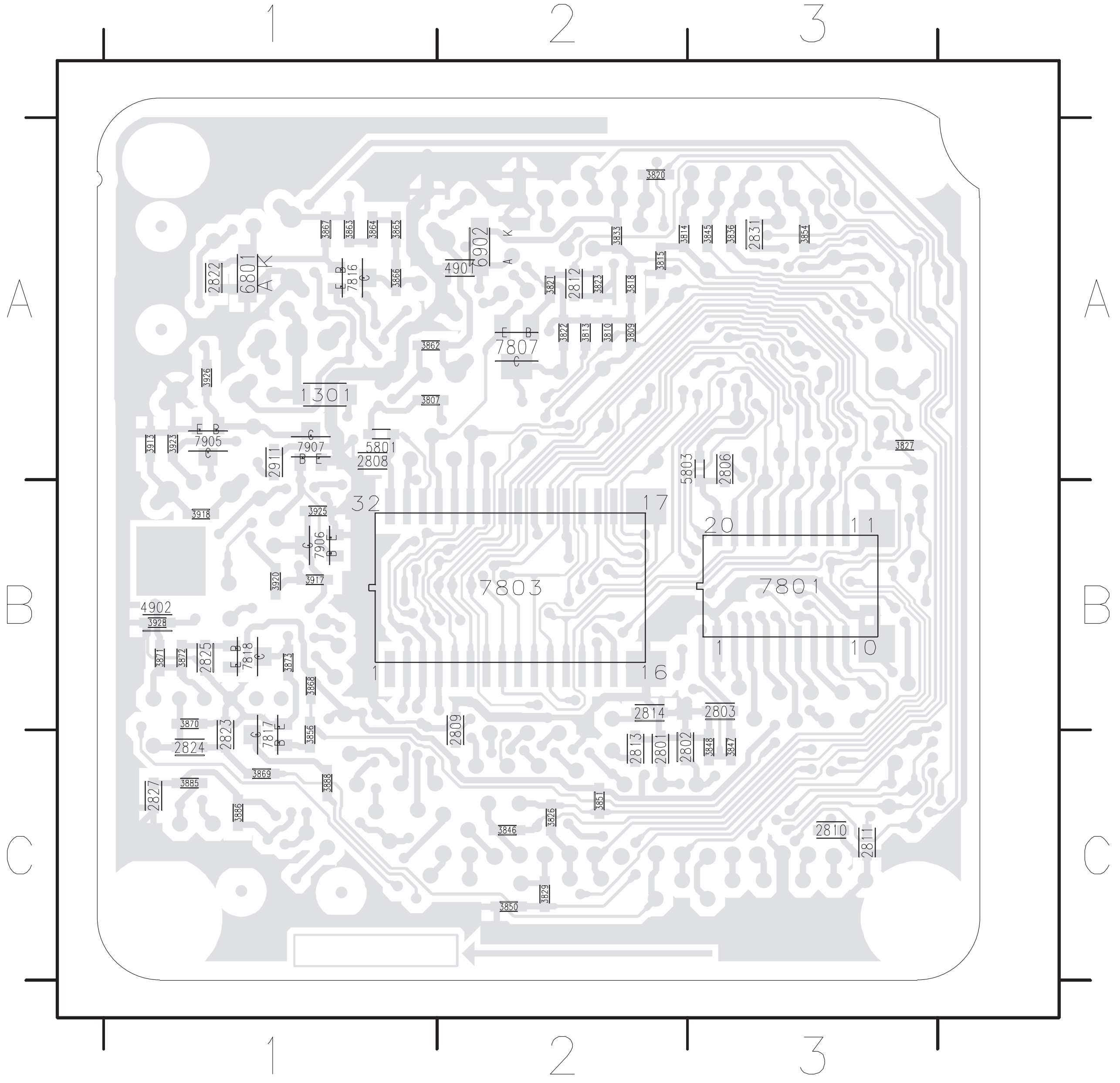


0606	B3	3819	C3	3929	A3
1801	C2	3824	B3	3930	A3
1805	C2	3825	C2	3931	A3
1901	A1	3828	A2	3932	A3
1980	C2	3830	C2	3933	A3
1984	A2	3831	A1	3934	A3
1986	C1	3832	B1	4801	B1
1987	A1	3834	A1	4802	B2
1988	C2	3835	A1	4903	A3
2800	C3	3837	C2	5802	B3
2804	B1	3838	A1	5804	A1
2805	A2	3839	A2	6800	A2
2807	C3	3840	A2	6802	A3
2815	A2	3841	A2	6803	A1
2816	A3	3842	A2	6804	C2
2817	A1	3843	A2	6805	C3
2818	A2	3844	A2	6901	B3
2819	A3	3849	A2	6903	B3
2820	C2	3852	C2	7802	C3
2821	A2	3855	C3	7804	B2
2826	C3	3857	B1	7805	B3
2828	C3	3858	A1	7806	C3
2829	A3	3860	A1	7808	C3
2830	B3	3861	A2	7810	C3
2832	C2	3874	B1	7811	C3
2833	C3	3875	B1	7813	A2
2834	C3	3876	C3	7814	A2
2835	C3	3878	B1	7815	A2
2912	B3	3879	B2	7821	C1
2913	A3	3881	C2	7822	C1
3800	B2	3882	B2	7825	B3
3801	C3	3884	C3	7902	B3
3802	C2	3887	C3	7903	A3
3803	B2	3889	C2	7904	B3
3804	C1	3914	A3	7908	A3
3805	B1	3915	A3	7909	A3
3806	C1	3916	B3	7910	B3
3808	B3	3919	B3		
3811	B1	3921	C3		
3812	B1	3922	B3		
3816	C1	3924	A3		
3817	A1	3927	B3		

TR 06012_001
040203

Layout UP Sub Board (Bottom View)

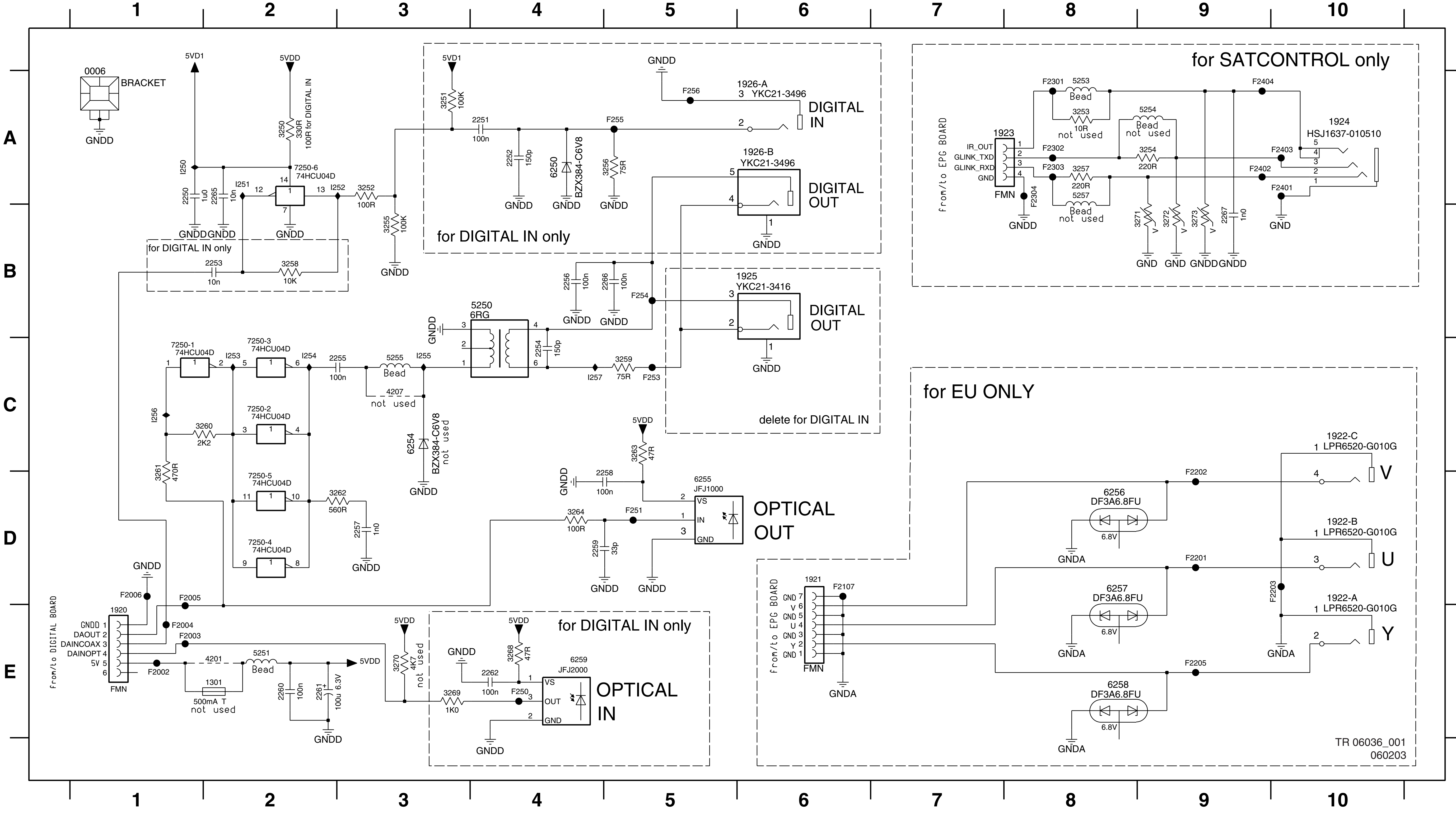
1301	A1	2824	C1	3822	A2	3856	C1	3886	C1	6801	A1
2801	C2	2825	B1	3823	A2	3862	A1	3888	C1	6902	A2
2802	C2	2827	C1	3826	C2	3863	A1	3913	A1	7801	B3
2803	B3	2831	A3	3827	A3	3864	A1	3917	B1	7803	B2
2806	A3	2911	A1	3829	C2	3865	A1	3918	B1	7807	A2
2808	A1	3807	A1	3833	A2	3866	A1	3920	B1	7816	A1
2809	B2	3809	A2	3836	A3	3867	A1	3923	A1	7817	C1
2810	C3	3810	A2	3845	A3	3868	B1	3925	B1	7818	B1
2811	C3	3813	A2	3846	C2	3869	C1	3926	A1	7905	A1
2812	A2	3814	A2	3847	C3	3870	B1	3928	B1	7906	B1
2813	C2	3815	A2	3848	C3	3871	B1	4901	A2	7907	A1
2814	B2	3818	A2	3850	C2	3872	B1	4902	B1		
2822	A1	3820	A2	3851	C2	3873	B1	5801	A1		
2823	C1	3821	A2	3854	A3	3885	C1	5803	A2		



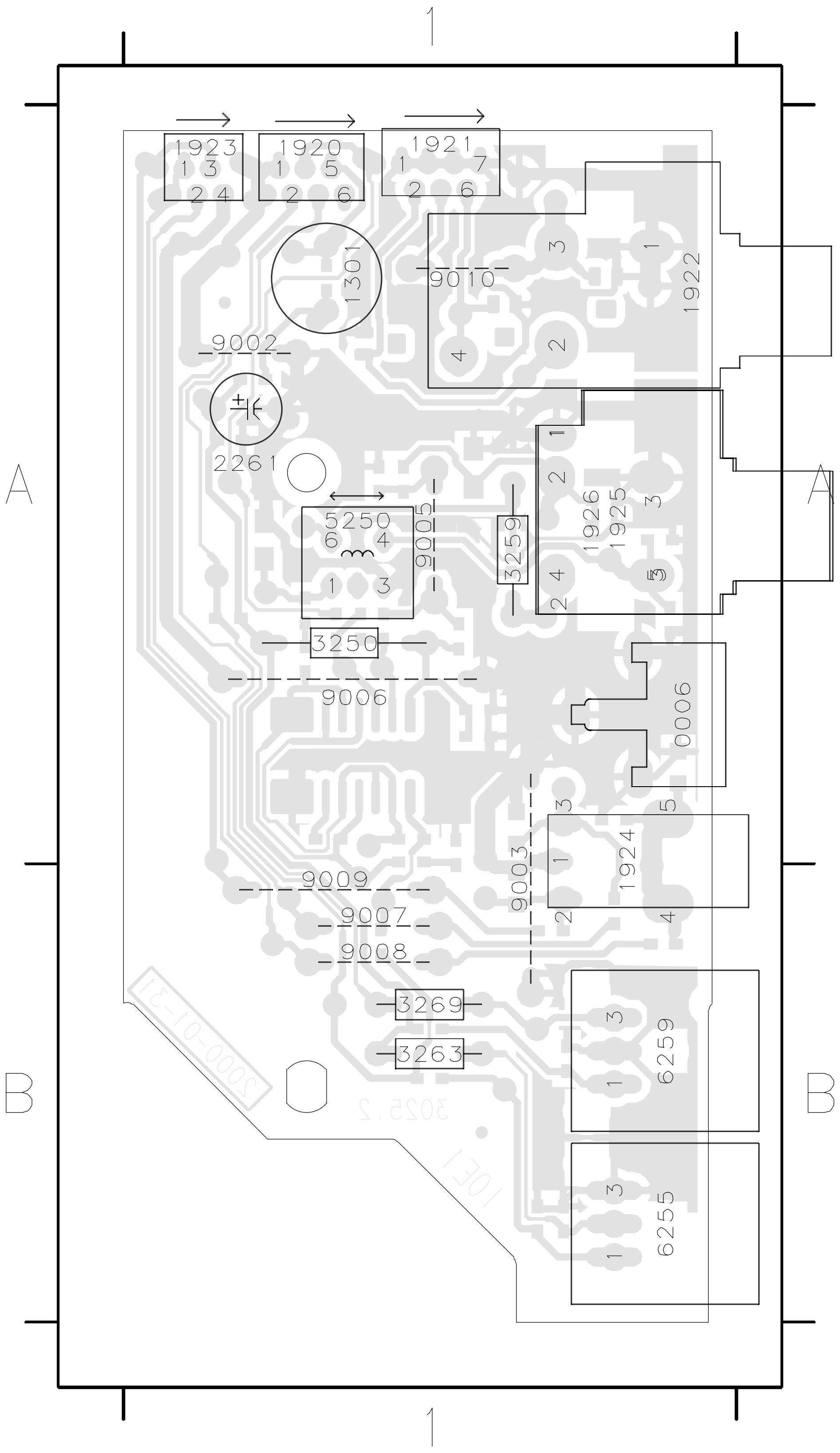
TR 06013_001
040203

In/Out Extension Board IOE

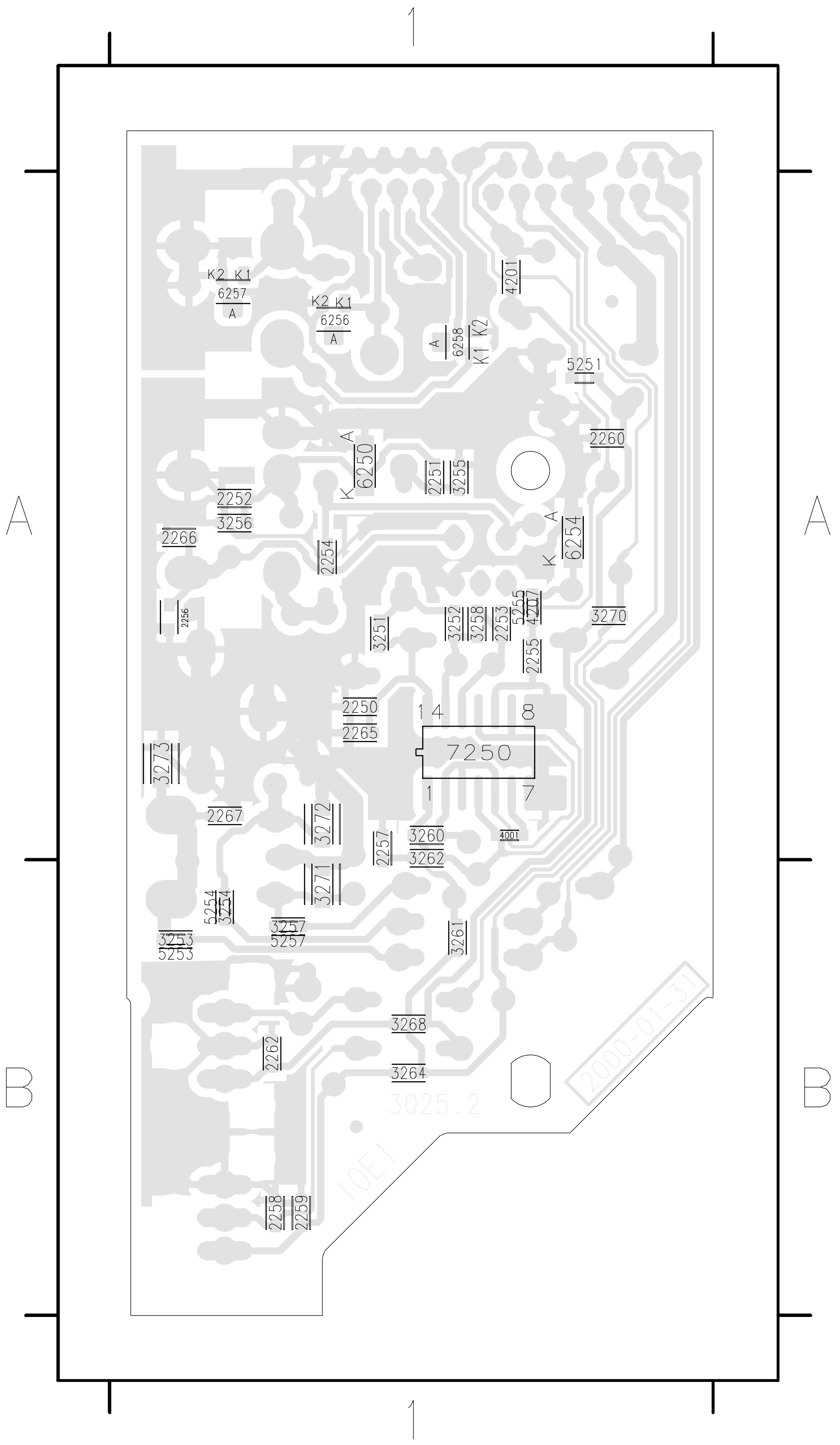
0006 A1	1922-C C10	2250 A1	2256 B4	2262 E4	3252 A3	3258 B2	3264 D4	3273 B9	5254 A9	6256 D8	7250-3 C2	F2004 E1	F2203 D10	F2401 A10	F253 C5	I252 A3
1301 E2	1923 A8	2251 A4	2257 D3	2265 A2	3253 A8	3259 C5	3268 E4	4201 E2	5255 C3	6257 D8	7250-4 D2	F2005 D1	F2205 E9	F2402 A9	F254 B5	I253 C2
1920 E1	1924 A10	2252 A4	2258 D5	2266 B5	3254 A9	3260 C2	3269 E3	4207 C3	5257 A8	6258 E8	7250-5 D2	F2006 D1	F2301 A8	F2403 A10	F255 A5	I254 C2
1921 D6	1925 B5	2253 B2	2259 D4	2267 B9	3255 B3	3261 D1	3270 E3	5250 B4	6250 A4	6259 E4	7250-6 A2	F2107 D6	F2302 A8	F2404 A9	F256 A5	I255 C3
1922-A D10	1926-A A6	2254 C4	2260 E2	3250 A2	3256 A5	3262 D3	3271 B9	5251 E2	6254 C3	7250-1 C1	F2002 E1	F2201 D9	F2303 A8	F250 E4	I250 A1	I256 C1
1922-B D10	1926-B A6	2255 C3	2261 E2	3251 A3	3257 A8	3263 C5	3272 B9	5253 A8	6255 D5	7250-2 C2	F2003 E1	F2202 D9	F2304 A8	F251 D5	I251 A2	I257 C4



Layout In / Out Extension Board



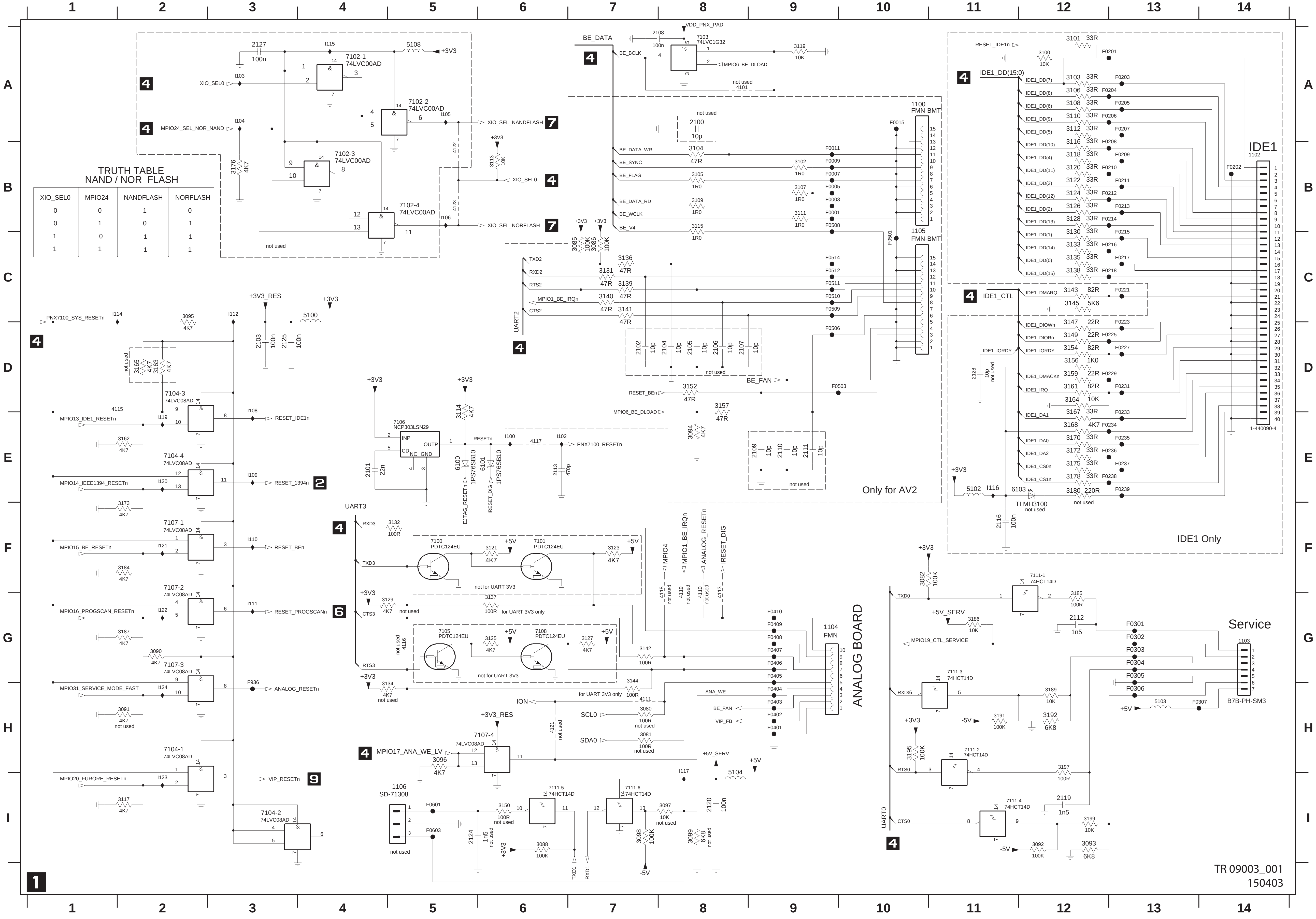
0006	A1
1301	A1
1920	A1
1921	A1
1922	A1
1923	A1
1924	A1
1925	A1
1926	A1
2261	A1
3250	A1
3259	A1
3263	B1
3269	B1
5250	A1
6255	B1
6259	B1
9002	A1
9003	B1
9005	A1
9006	A1
9007	B1
9008	B1
9009	B1
9010	A1



2250	A1
2251	A1
2252	A1
2253	A1
2254	A1
2255	A1
2256	A1
2257	A1
2258	B1
2259	B1
2260	A1
2262	B1
2265	A1
2266	A1
2267	A1
3251	A1
3252	A1
3253	B1
3254	B1
3255	A1
3256	A1
3257	B1
3258	A1
3260	A1
3261	B1
3262	A1
3264	B1
3268	B1
3270	A1
3271	B1
3272	A1
3273	A1
4001	A1
4201	A1
4207	A1
5251	A1
5253	B1
5254	B1
5255	A1
5257	B1
6250	A1
6254	A1
6256	A1
6257	A1
6258	A1
7250	A1

TR 06037_001
060203

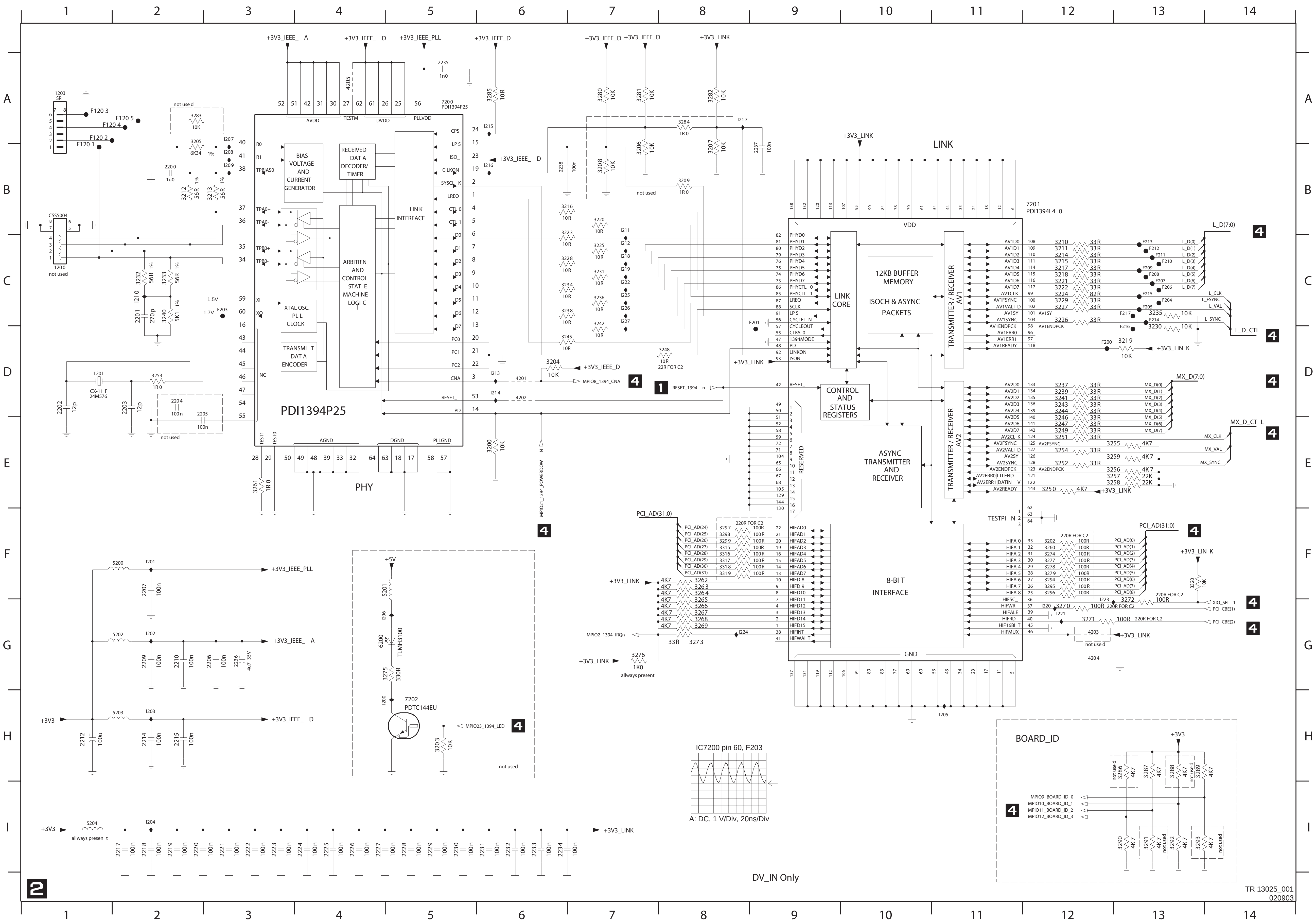
Digital Board Chrysalis 2.1: IDE, UARTS, RESET, BE



XIO_SEL0	MPIO24	NANDFLASH	NORFLASH
0	0	1	0
0	1	0	1
1	0	1	1
1	1	1	1

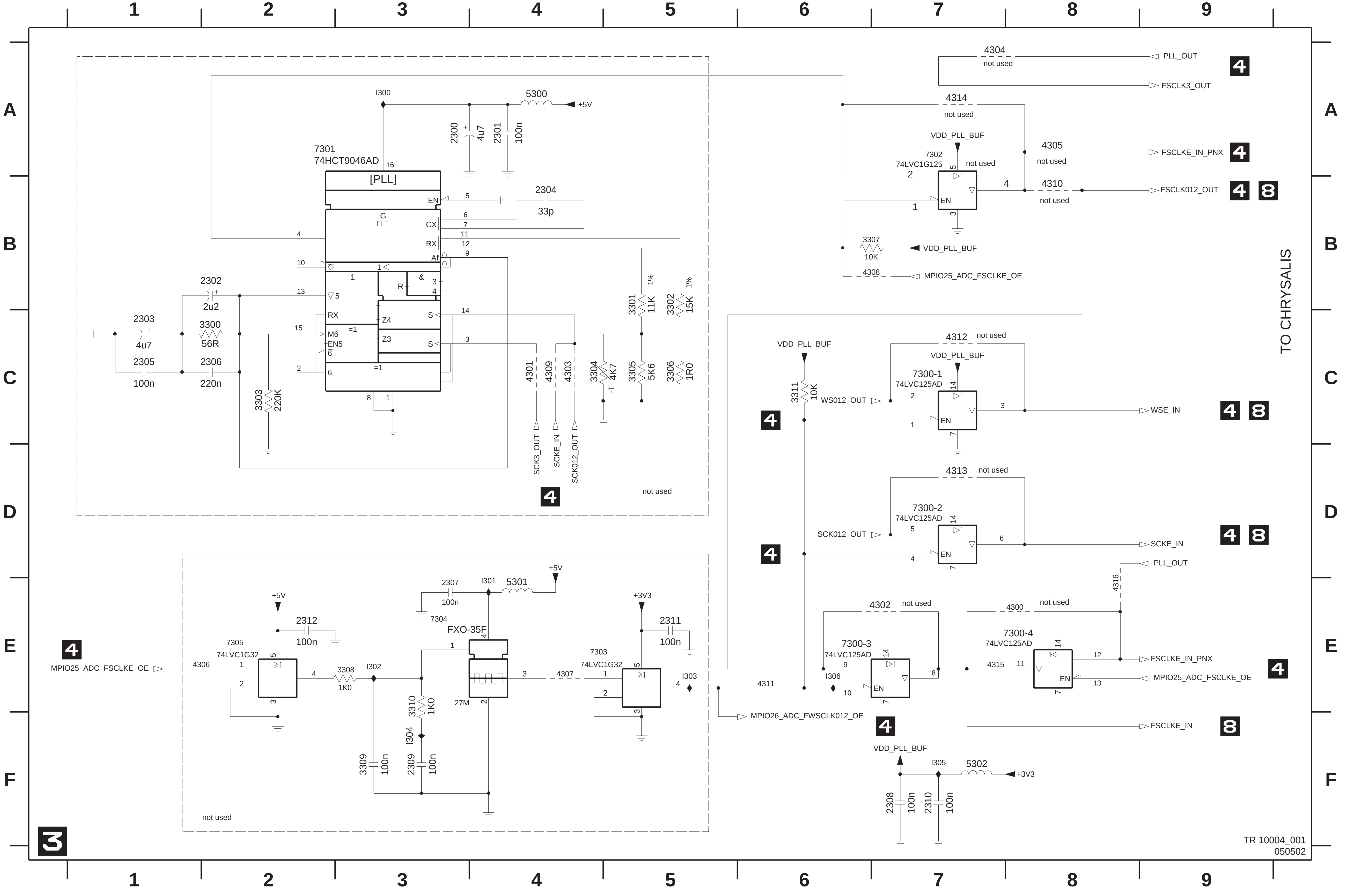
1100	A10
1102	B14
1103	G14
1104	G9
1105	C10
1106	I5
2100	A8
2101	E4
2102	D7
2103	D3
2104	D8
2105	D8
2106	D8
2107	D8
2108	A7
2109	E9
2110	E9
2111	E9
2112	G12
2113	E6
2116	F11
2119	I12
2120	I8
2124	I5
2125	D3
2127	A3
2128	D11
3080	H7
3081	H7
3082	F10
3085	C7
3086	C7
3088	I6
3090	G2
3091	H2
3092	I12
3093	I12
3094	E8
3095	C2
3096	H5
3097	I8
3098	I7
3099	I8
3100	A12
3101	A12
3102	B9
3103	A12
3104	B8
3105	B8
3106	A12
3107	B9
3108	A12
3109	B8
3110	A12
3111	B9
3112	A12
3113	B6
3114	D5
3115	B8
3116	B12
3117	I2
3118	B12
3119	A9
3120	B12
3121	F6
3122	B12
3123	F7
3124	B12
3125	G6
3126	B12
3127	G7
3128	B12
3129	G4
3130	C12
3131	C7
3132	F5
3133	C12
3134	H4
3135	C12
3136	C7
3137	G6
3138	C12
3139	C7
3140	C7
3141	C7
3142	G7
3143	C12
3144	G7
3145	C12
3147	D12
3149	D12
3150	I6
3152	D8
3154	D12
3156	D12
3157	D8
3159	D12
3161	D12
3162	E2
3163	D2
3164	D12
3165	D2
3167	E12
3168	E12
3170	E12
3172	E12
3173	F2
3175	E12
3176	B3
3178	E12
3180	E12
3184	F2
3185	G12
3186	G11
3187	G2
3189	H12
3191	H11
3192	H12
3195	H10
3197	H12
3199	I12
4101	A8
4110	F8
4111	H7
4113	F8
4115	D1
4116	G5
4117	E6
4118	F8
4119	F8
4121	H6
4122	B5
4123	B5
5100	C4
5102	E11
5103	H13
5104	I8
5108	A5
6100	E5
6101	E6
6103	E11
7100	F5
7101	F6
7102-1	A4
7102-2	A5
7102-3	B4
7102-4	B5
7103	A8
7104-1	H2
7104-2	I3
7104-3	D2
7104-4	E2
7105	G5
7106	E5
7107-1	F2
7107-2	F2
7107-3	G2
7107-4	H5
7108	G6
7111-1	F12
7111-2	H11
7111-3	G11
7111-4	I11
7111-5	I6
7111-6	I7
F0001	B9
F0003	B9
F0005	B9
F0007	B9
F0009	B9
F0011	B9
F0015	A10
F0201	A13
F0202	B14
F0203	A13
F0204	A13
F0205	A13
F0206	A13
F0207	A13
F0208	B13
F0209	B13
F0210	B13
F0211	B13
F0212	B13
F0213	B13
F0214	B13
F0215	C13
F0216	C13
F0217	C13
F0218	C13
F0221	C13
F0223	D13
F0225	D13
F0227	D13
F0229	D13
F0231	D13
F0233	E13
F0234	E13
F0235	E13
F0236	E13
F0237	E13
F0238	E13
F0239	E13
F0301	G13
F0302	G13
F0303	G13
F0304	G13
F0305	G13
F0306	H13
F0307	H14
F0401	H9
F0402	H9
F0403	H9
F0404	H9
F0405	G9
F0406	G9
F0407	G9
F0408	G9
F0409	G9
F0410	G9
F0501	C10
F0503	D10
F0506	D9
F0508	B9
F0509	C9
F0510	C9
F0511	C9
F0512	C9
F0514	C9
F0601	I5
F0603	I5
F936	H3
I100	E6
I102	E6
I103	A3
I104	A3
I105	A5
I106	B5
I108	D3
I109	E3
I110	F3
I111	G3
I112	C3
I114	C1
I115	A4
I116	E11
I117	H8
I119	E2
I120	E2
I121	F2
I122	G2
I123	I2
I124	H2

Digital Board Chrysalis 2.1: 1394



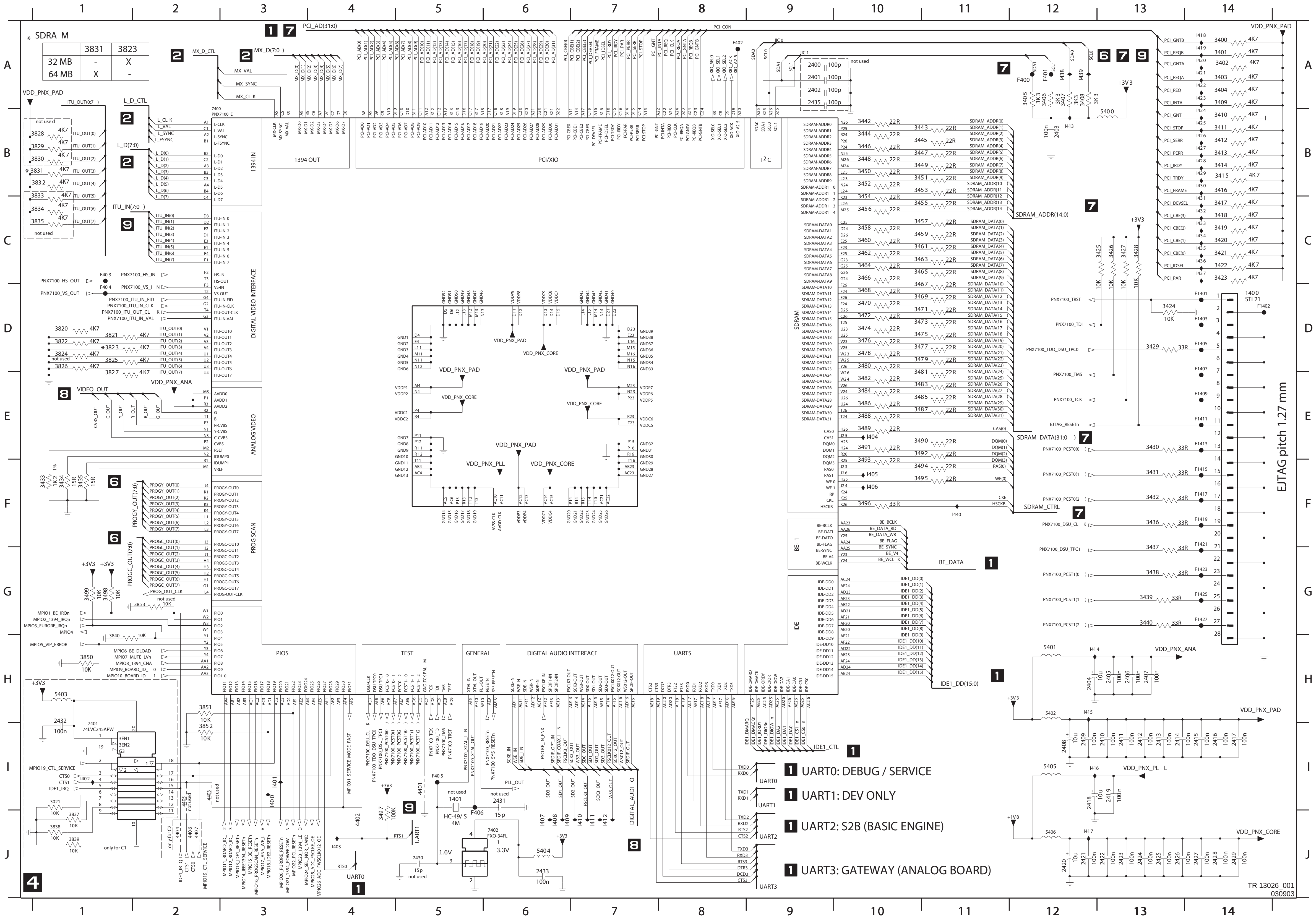
1200	C1
1201	D1
1203	A1
2200	B2
2201	C2
2202	D1
2203	D2
2204	D2
2205	D2
2206	G3
2207	F2
2209	G2
2210	G2
2212	H1
2214	H2
2215	H2
2217	I2
2218	I2
2219	I2
2220	I2
2221	I3
2222	I3
2223	I3
2224	I4
2225	I4
2226	I4
2227	I4
2228	I5
2229	I5
2230	I5
2231	I6
2232	I6
2233	I6
2234	I6
2235	A5
2236	G3
2237	B9
2238	B6
3200	E6
3202	F12
3203	H5
3204	D6
3205	A2
3206	B7
3207	B8
3208	B7
3209	B8
3210	C12
3211	C12
3212	B2
3213	B3
3214	C12
3215	C12
3216	B6
3217	C12
3218	C12
3219	D13
3220	B7
3221	C12
3222	C12
3223	B6
3224	C12
3225	C7
3226	C12
3227	C12
3228	C6
3229	C12
3230	D13
3231	C7
3232	C2
3233	C2
3234	C6
3235	C13
3236	C7
3237	D12
3238	C6
3239	D12
3240	C2
3241	D12
3242	C7
3243	D12
3244	D12
3245	D6
3246	E12
3247	E12
3248	D7
3249	E12
3250	E12
3251	E12
3252	E12
3253	D2
3254	E12
3255	E13
3256	E13
3257	E13
3258	E13
3259	E13
3260	F12
3261	E3
3262	F8
3263	F8
3264	F8
3265	G8
3266	G8
3267	G8
3268	G8
3269	G8
3270	G12
3271	G12
3272	G12
3273	G8
3274	F12
3275	G5
3276	G7
3277	F12
3278	F12
3279	F12
3280	A7
3281	A7
3282	A8
3283	A2
3284	A8
3285	A6
3286	H13
3287	H13
3288	H13
3289	H13
3290	I13
3291	I13
3292	I13
3293	I13
3294	F12
3295	F12
3296	F12
3297	F8
3298	F8
3299	F8
3315	F8
3316	F8
3317	F8
3318	F8
3319	F8
3320	F13
4201	D6
4202	D6
4203	G12
4204	G12
4205	A4
5200	F2
5201	F5
5202	G2
5203	H2
5204	I1
6200	G4
7200	A5
7201	B12
7202	H5
F1201	B1
F1202	A1
F1203	A1
F1204	A2
F1205	A2
F200	D12
F201	C9
F203	C3
F204	C13
F205	C13
F206	C13
F207	C13
F208	C13
F209	C13
F210	C13
F211	C13
F212	C13
F213	C13
F214	C13
F215	C13
F216	D13
F217	C13
I200	H4
I201	F2
I202	G2
I203	H2
I204	I2
I205	H11
I206	G4
I207	A3
I208	B3
I209	B3
I210	C2
I211	B7
I212	C7
I213	D6
I214	D6
I215	A6
I216	B6
I217	A8
I218	C7
I219	C7
I220	G12
I221	G12
I222	C7
I223	G12
I224	G8
I225	C7
I226	C7
I227	C7

Digital Board Chrysalis 2.1: Audio PLL



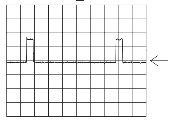
2300	A3
2301	A4
2302	B2
2303	C1
2304	B4
2305	C1
2306	C2
2307	E3
2308	F7
2309	F3
2310	F7
2311	E5
2312	E2
3300	C2
3301	B5
3302	B5
3303	C2
3304	C4
3305	C5
3306	C5
3307	B6
3308	E3
3309	F3
3310	E3
3311	C6
4300	E8
4301	C4
4302	E7
4303	C4
4304	A7
4305	A8
4306	E1
4307	E4
4308	B6
4309	C4
4310	B8
4311	E6
4312	C7
4313	D7
4314	A7
4315	E7
4316	E8
5300	A4
5301	E4
5302	F7
7300-1	C7
7300-2	D7
7300-3	E6
7300-4	E8
7301	A2
7302	A7
7303	E5
7304	E3
7305	E2
I300	A3
I301	E4
I302	E3
I303	E5
I304	F3
I305	F7
I306	E6

Digital Board Chrysalis 2.1: Chrysalis



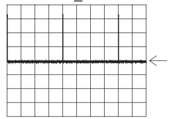
1400	D14	3447	B11	5400	B13
1401	I5	3448	B10	5401	H12
2400	A9	3449	B11	5402	H12
2401	A9	3450	B10	5403	H1
2402	A9	3451	B11	5404	J6
2403	B12	3452	B10	5405	I12
2404	H12	3453	B11	5406	J12
2405	H13	3454	C10	7400	B2
2406	H13	3455	C11	7401	I1
2407	H13	3456	C10	7402	J6
2408	I12	3457	C11	F1401	D14
2409	I12	3458	C10	F1402	D14
2410	I13	3459	C11	F1403	D14
2411	I13	3460	C10	F1405	D14
2412	I13	3461	C11	F1407	D14
2413	I13	3462	C10	F1409	E14
2414	I13	3463	C11	F1411	E14
2415	I14	3464	C10	F1413	E14
2416	I14	3465	C11	F1415	F14
2417	I14	3466	C10	F1417	F14
2418	I12	3467	D11	F1419	F14
2419	I13	3468	D10	F1421	F14
2420	J12	3469	D11	F1423	G14
2421	J12	3470	D10	F1425	G14
2422	J13	3471	D11	F1427	G14
2423	J13	3472	D10	F400	A12
2424	J13	3473	D11	F401	A12
2425	J13	3474	D10	F402	A8
2426	J13	3475	D11	F403	C1
2427	J14	3476	D10	F404	D1
2428	J14	3477	D11	F405	I5
2429	J14	3478	D10	F406	I5
2430	J5	3479	D11	I400	I3
2431	I6	3480	D10	I401	I3
2432	I1	3481	E11	I402	I1
2433	J6	3482	E10	I403	J4
2435	A9	3483	E11	I404	E10
3021	I1	3484	E10	I405	F10
3400	A14	3485	E11	I406	F10
3401	A14	3486	E10	I407	J6
3402	A14	3487	E11	I408	J6
3403	A14	3488	E10	I409	J6
3404	A14	3489	E10	I410	J7
3405	A12	3490	E11	I411	J7
3406	A12	3491	E10	I412	J7
3407	A12	3492	E11	I413	B12
3408	A12	3493	F10	I414	H12
3409	A14	3494	F11	I415	H12
3410	B14	3495	F11	I416	I12
3411	B14	3496	F10	I417	J12
3412	B14	3497	J4	I418	A14
3413	B14	3498	G1	I419	A14
3414	B14	3499	G1	I420	A14
3415	B14	3820	D1	I421	A14
3416	B14	3821	D1	I422	A14
3417	C14	3822	D1	I423	A14
3418	C14	3823	D1	I424	B14
3419	C14	3824	D1	I425	B14
3420	C14	3825	D1	I426	B14
3421	C14	3826	D1	I427	B14
3422	C14	3827	E1	I428	B14
3423	C14	3828	B1	I429	B14
3424	D13	3829	B1	I430	B14
3425	C13	3830	B1	I431	C14
3426	C13	3831	B1	I432	C14
3427	C13	3832	B1	I433	C14
3428	C13	3833	C1	I434	C14
3429	D13	3834	C1	I435	C14
3430	E13	3835	C1	I436	C14
3431	F13	3837	J1	I437	C14
3432	F13	3838	J1	I438	A12
3433	F1	3839	J1	I439	A12
3434	F1	3840	H1	I440	F11
3435	F1	3850	H1		
3436	F13	3851	H2		
3437	G13	3852	I2		
3438	G13	3853	G2		
3439	G13	4401	I5		
3440	G13	4402	J4		
3442	B10	4403	I2		
3443	B11	4404	J2		
3444	B10	4405	J2		
3445	B11	4406	J2		
3446	B10	4407	J2		

HS_IN



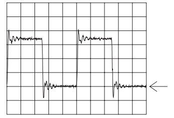
A: DC, 2 V/Div, 10us/Div

VS_IN



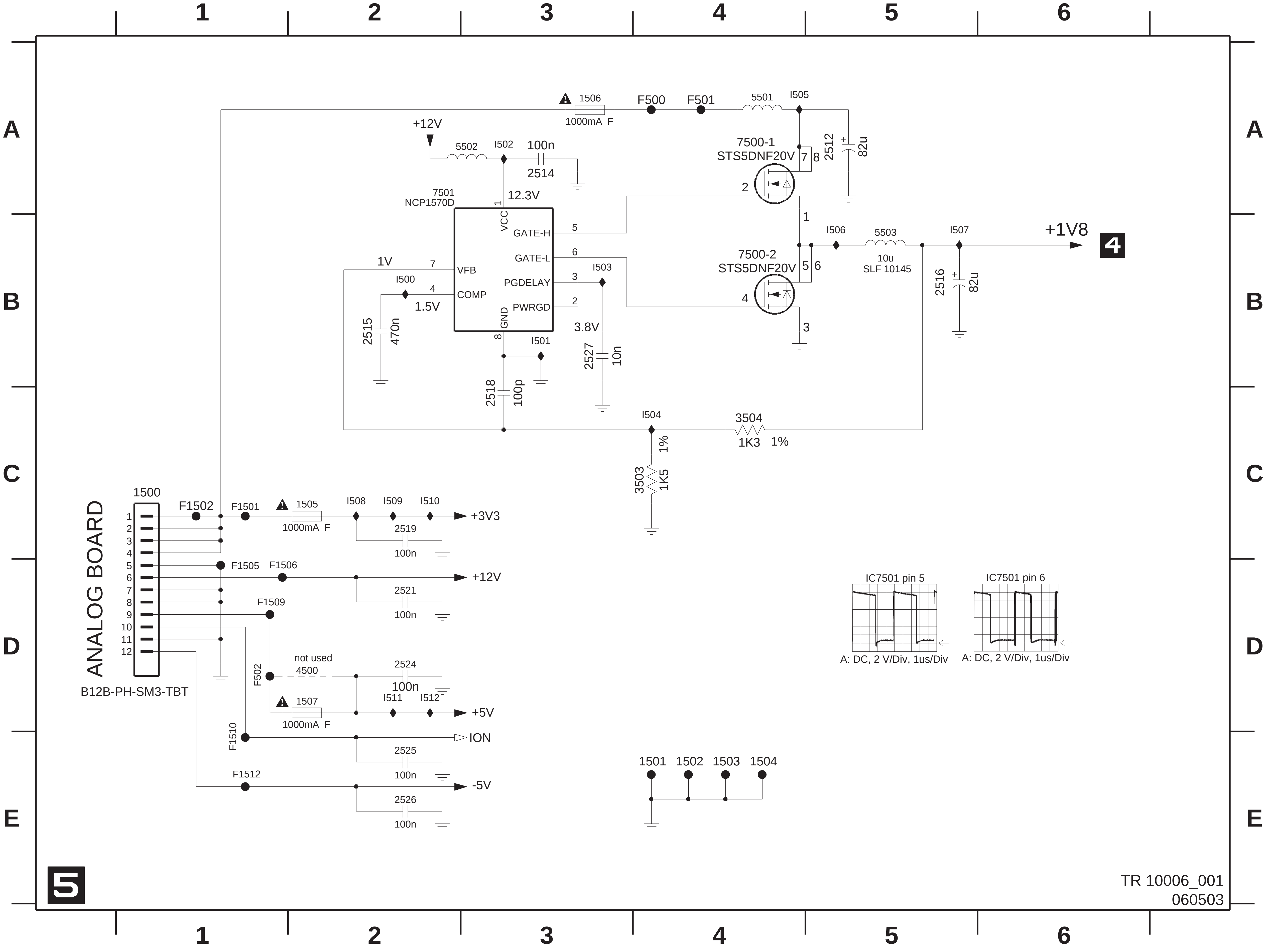
A: DC, 1 V/Div, 5ms/Div

IC7402 pin 3, F405



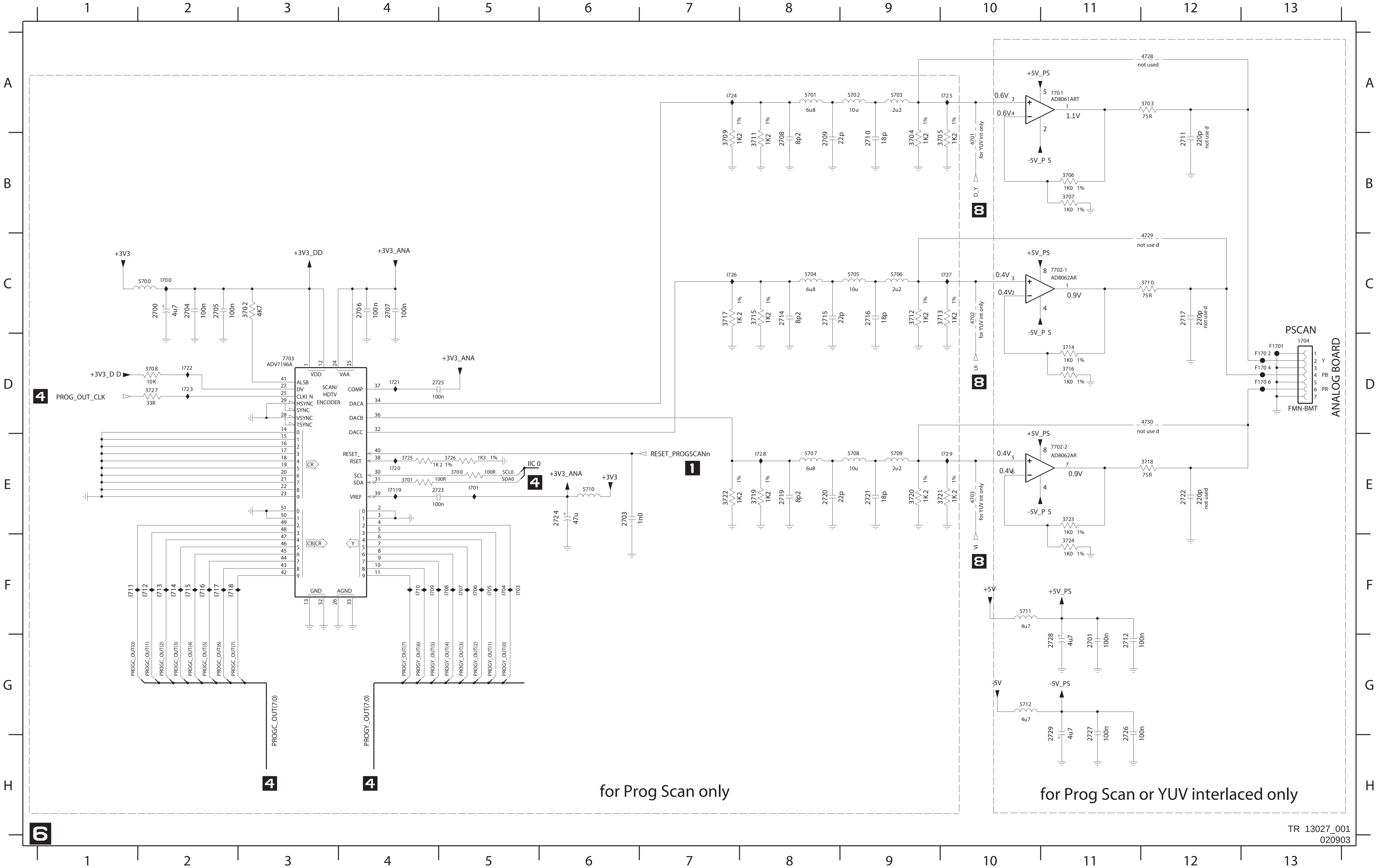
A: DC, 1 V/Div, 50ns/Div

Digital Board Chrysalis 2.1: 1.8V Power



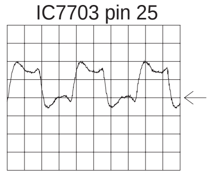
1500	C1
1501	E4
1502	E4
1503	E4
1504	E4
1505	C2
1506	A3
1507	D2
2512	A5
2514	A3
2515	B2
2516	B5
2518	C3
2519	C2
2521	D2
2524	D2
2525	E2
2526	E2
2527	B3
3503	C4
3504	C4
4500	D2
5501	A4
5502	A3
5503	B5
7500-1	A4
7500-2	B4
7501	A2
F1501	C1
F1502	C1
F1505	D1
F1506	D1
F1509	D1
F1510	E1
F1512	E1
F500	A4
F501	A4
F502	D1
I500	B2
I501	B3
I502	A3
I503	B3
I504	C4
I505	A4
I506	B5
I507	B5
I508	C2
I509	C2
I510	C2
I511	D2
I512	D2

Digital Board Chrysalis 2.1: Prog. scan DAC



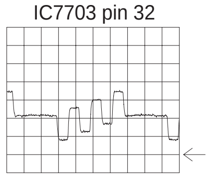
1704	D13
2700	C2
2701	G11
2703	E6
2704	C2
2705	C2
2706	C4
2707	C4
2708	B8
2709	B8
2710	B9
2711	B12
2712	G11
2714	C8
2715	C8
2716	C9
2717	C12
2719	E8
2720	E8
2721	E9
2722	E12
2723	E4
2724	E6
2725	D4
2726	G11
2727	G11
2728	G11
2729	G11
3700	E5
3701	E4
3702	C3
3703	A12
3704	B9
3705	B10
3706	B11
3707	B11
3708	D2
3709	B7
3710	C12
3711	B8
3712	C9
3713	C10
3714	D11
3715	C8
3716	D11
3717	C7
3718	E12
3719	E8
3720	E9
3721	E10
3722	E7
3723	E11
3724	F11
3725	E4
3726	E5
3727	D2
4701	B10
4702	C10
4703	E10
4728	A12
4729	C12
4730	D12
5700	C2
5701	A8
5702	A9
5703	A9
5704	C8
5705	C9
5706	C9
5707	E8
5708	E9
5709	E9
5710	E6
5711	F10
5712	G10
7701	A11
7702-1	C11
7702-2	E11
7703	D3
F1701	D13
F1702	D13
F1704	D13
F1706	D13
I700	C2
I701	E5
I703	F5
I704	F5
I705	F5
I706	F5
I707	F5
I708	F5
I709	F4
I710	F4
I711	F1
I7119	E4
I712	F2
I713	F2
I714	F2
I715	F2
I716	F2
I717	F2
I718	F2
I720	E4
I721	D4
I722	D2
I723	D2
I724	A7
I725	A10
I726	C7
I727	C10
I728	E8
I729	E10

IC7703 pin 25



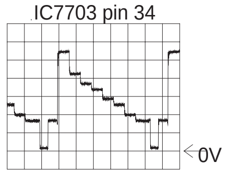
A: DC, 2 V/Div, 10ns/Div

IC7703 pin 32



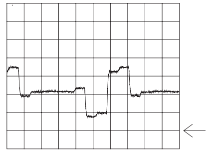
A: DC, 200mV/Div, 5us/Div

IC7703 pin 34



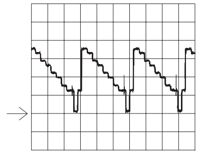
A: DC, 200mV/Div, 5us/Div

IC7703 pin 36



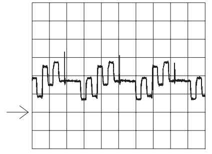
A: DC, 200mV/Div, 5us/Div

Y 1704-2



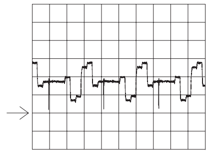
A: DC, 500mV/Div
10us/Div

PB 1704-4



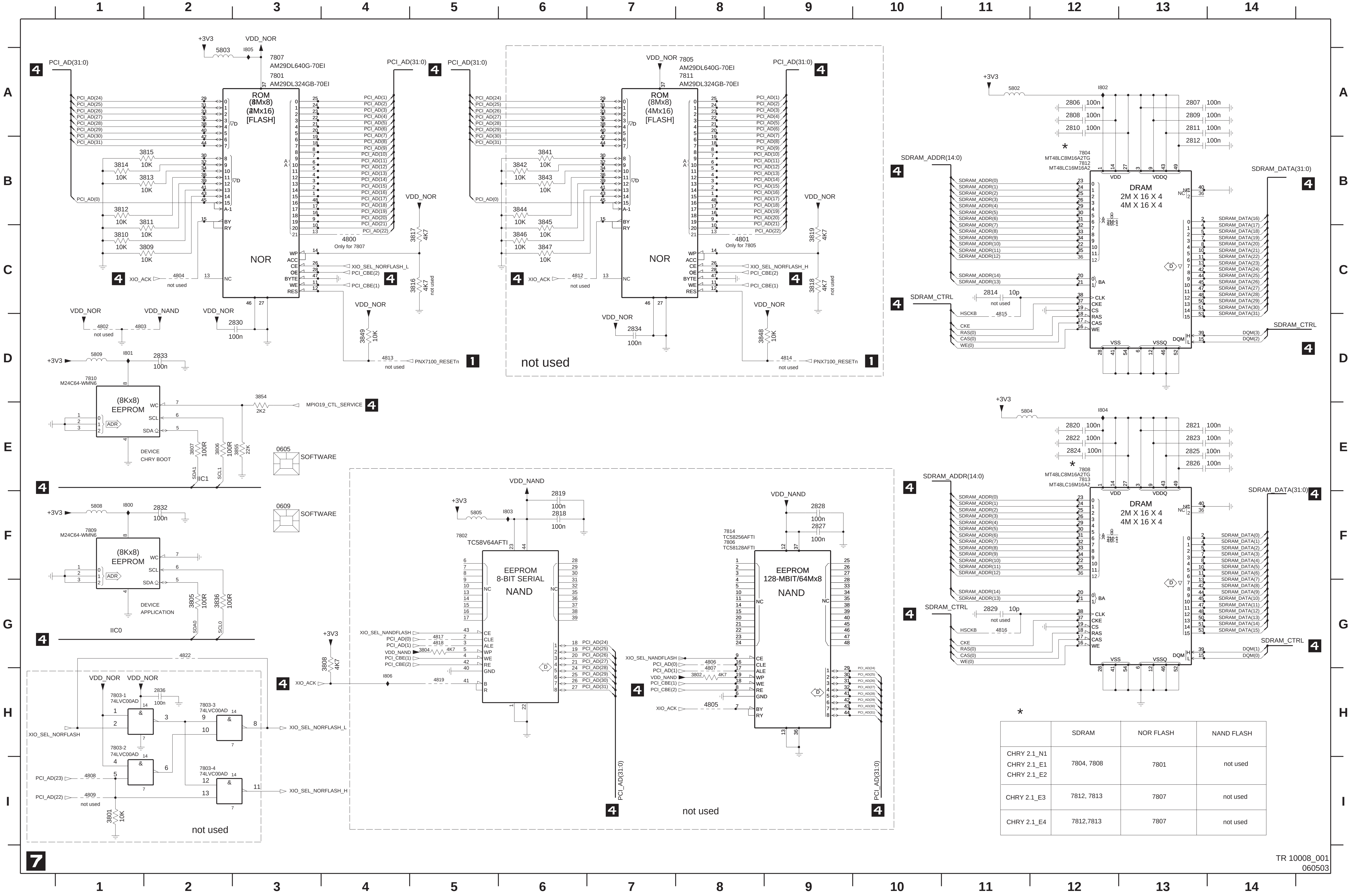
A: DC, 500mV/Div
10us/Div

PR 1704-6



A: DC, 500mV/Div
10us/Div

Digital Board Chrysalis 2.1: Flash SDRAM EEPROM

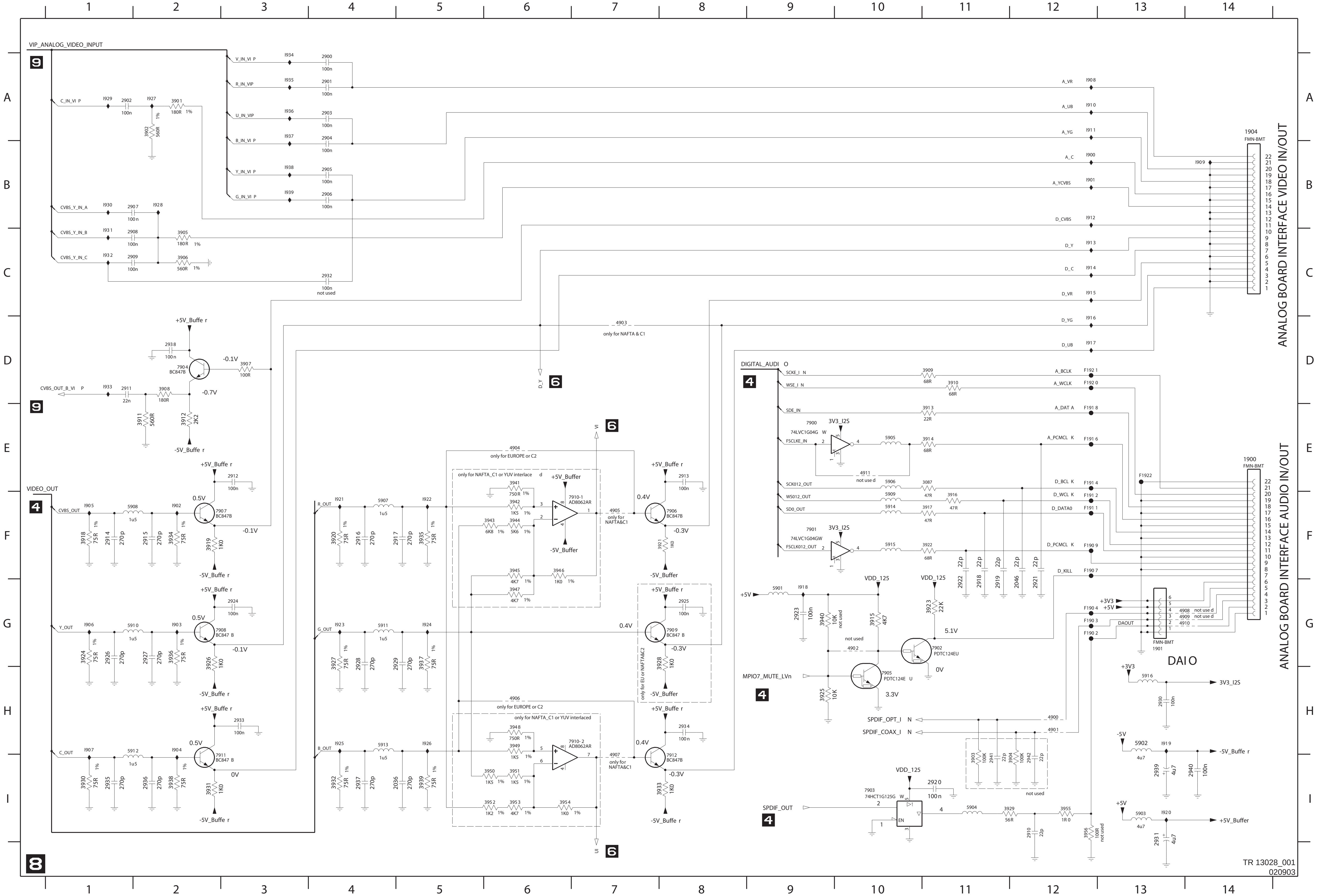


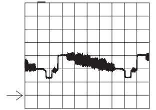
*

	SDRAM	NOR FLASH	NAND FLASH
CHRY 2.1_N1 CHRY 2.1_E1 CHRY 2.1_E2	7804, 7808	7801	not used
CHRY 2.1_E3	7812, 7813	7807	not used
CHRY 2.1_E4	7812,7813	7807	not used

0605	E3
0609	F3
2806	A12
2807	A13
2808	A12
2809	A13
2810	A12
2811	A13
2812	B13
2814	C11
2818	F6
2819	F6
2820	E12
2821	E13
2822	E12
2823	E13
2824	E12
2825	E13
2826	E13
2827	F9
2828	F9
2829	G11
2830	D3
2832	F2
2833	D2
2834	D7
2836	H2
3801	I1
3802	H8
3804	G5
3805	G2
3806	E2
3807	E2
3808	G4
3809	C2
3810	C1
3811	B2
3812	B1
3813	B2
3814	B1
3815	B2
3816	C5
3817	C5
3818	C9
3819	C9
3836	G2
3841	B6
3842	B6
3843	B6
3844	B6
3845	B6
3846	C6
3847	C6
3848	D8
3849	D4
3854	D3
3855	E3
4800	C4
4801	C8
4802	D1
4803	D1
4804	C2
4805	H8
4806	G8
4807	H8
4808	I1
4809	I1
4812	C6
4813	D4
4814	D9
4815	D11
4816	G11
4817	G5
4818	G5
4819	H5
4822	G2
5802	A11
5803	A2
5804	E11
5805	F5
5808	F1
5809	D1
7801	A3
7802	F5
7803-1	H1
7803-2	H1
7803-3	H2
7803-4	I2
7804	B12
7805	A8
7806	F8
7807	A3
7808	E12
7809	F1
7810	D1
7811	A8
7812	B12
7813	E12
7814	F8
I800	F1
I801	D1
I802	A12
I803	F6
I804	E12
I805	A3
I806	H4

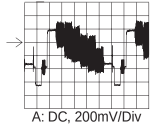
Digital Board Chrysalis 2.1: Video IO





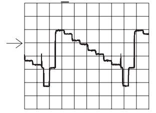
A_YCVBS 1904-14

A: DC, 500mV/Div
10us/Div



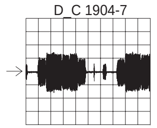
D_YCVBS 1904-11

A: DC, 200mV/Div
10us/Div



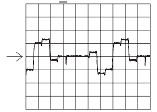
D_Y 1904-9

A: DC, 200mV/Div
10us/Div



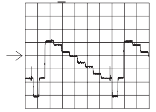
D_C 1904-7

A: DC, 200mV/Div
10us/Div



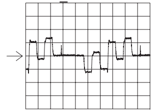
D_VR 1904-5

A: DC, 200mV/Div
10us/Div



D_YG 1904-3

A: DC, 200mV/Div
10us/Div

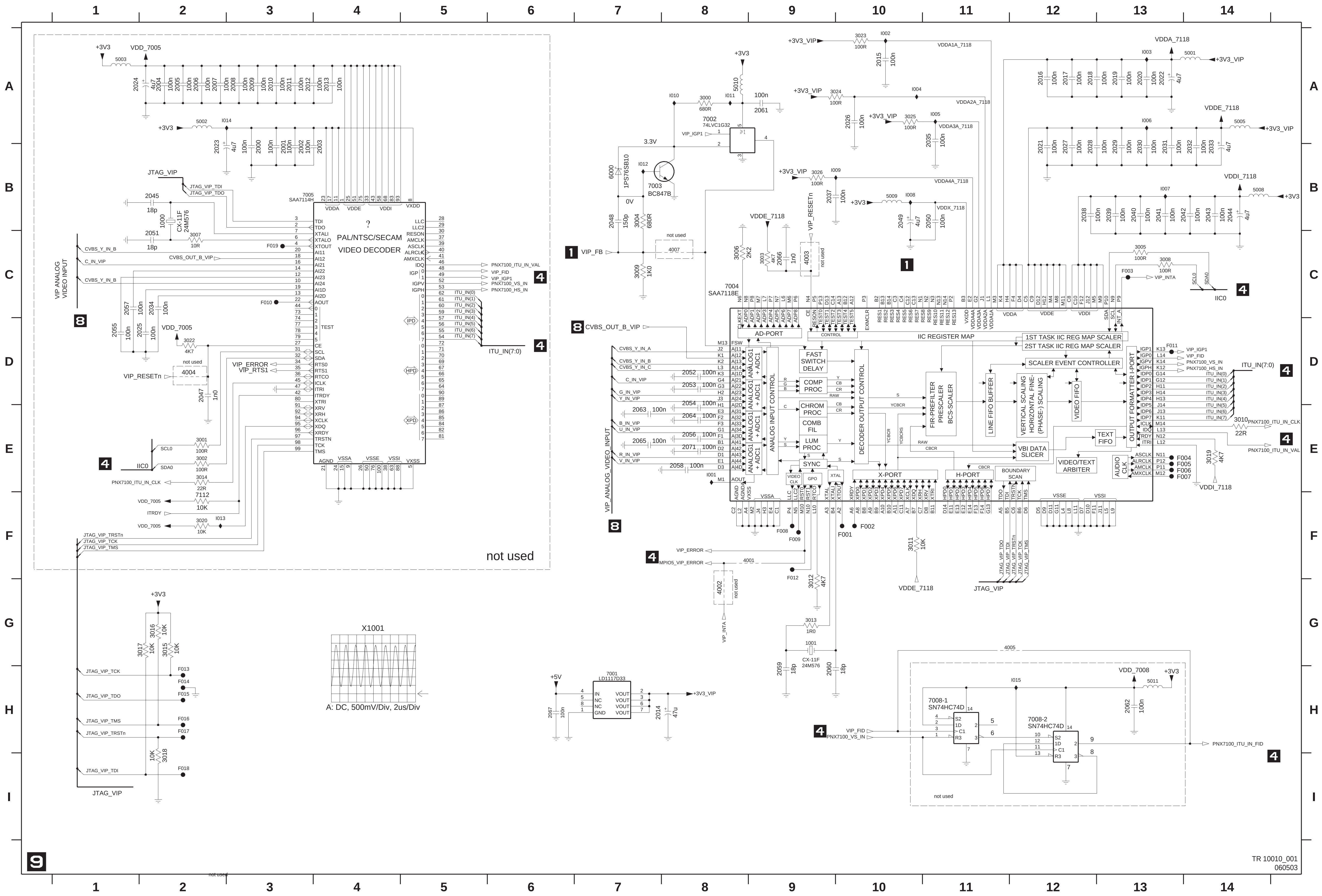


D_UB 1904-1

A: DC, 200mV/Div
10us/Div

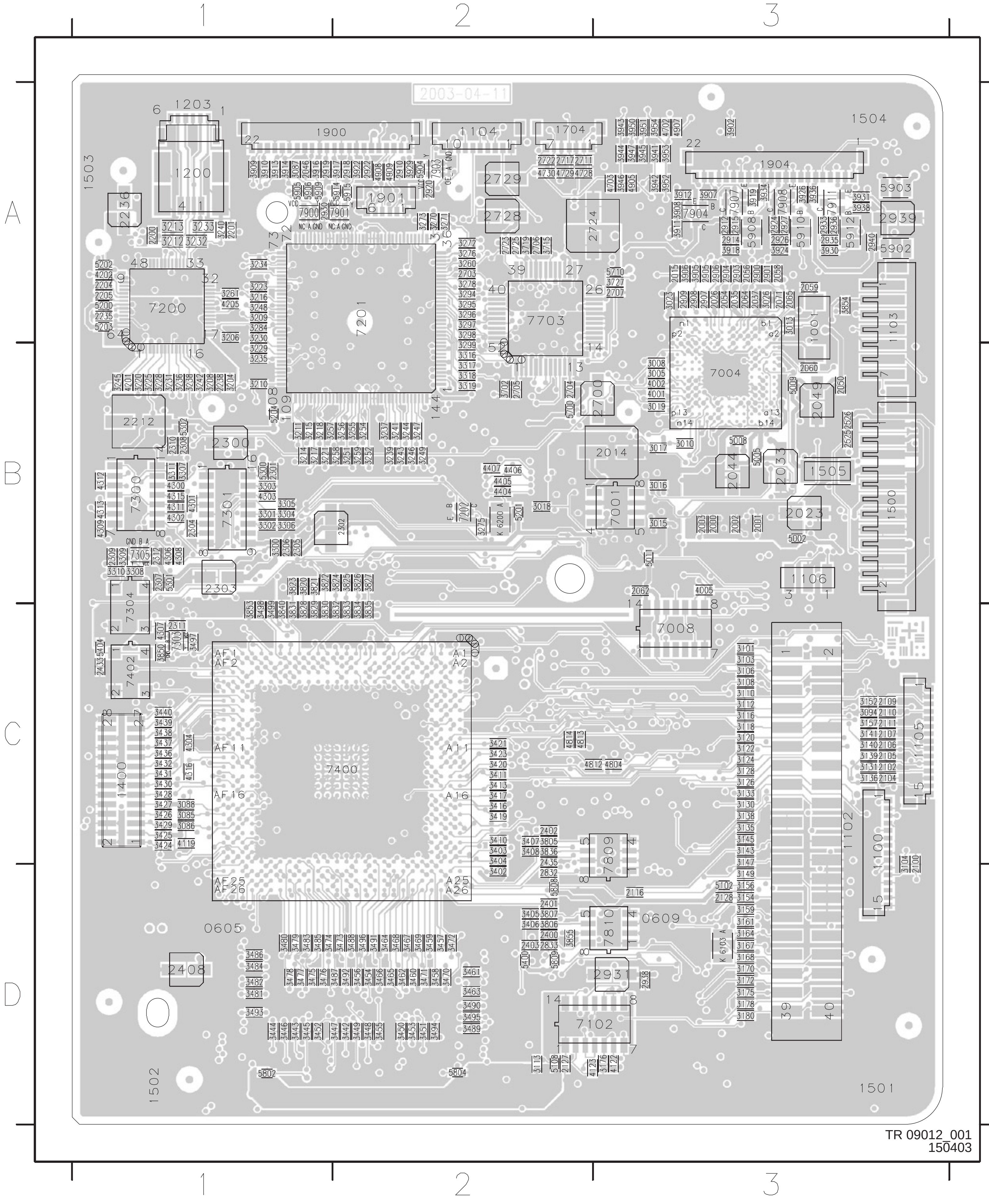
1900	E14
1901	G13
1904	A14
2036	I5
2046	G12
2900	A4
2901	A4
2902	A1
2903	A4
2904	A4
2905	B4
2906	B4
2907	B1
2908	C1
2909	C1
2910	I12
2911	D1
2912	E3
2913	E8
2914	F1
2915	F2
2916	F4
2917	F5
2918	G11
2919	G11
2920	I11
2921	G12
2922	G11
2923	G9
2924	G3
2925	G8
2926	G1
2927	G2
2928	G4
2929	G5
2930	H13
2931	I13
2932	C4
2933	H3
2934	H8
2935	I1
2936	I2
2937	I4
2938	D2
2939	I13
2940	I14
2941	I11
2942	I12
3087	E11
3901	A2
3902	A2
3903	I11
3904	I12
3905	C2
3906	C2
3907	D3
3908	D2
3909	D11
3910	D11
3911	E2
3912	E2
3913	E11
3914	E11
3915	G10
3916	F11
3917	F11
3918	F1
3919	F2
3920	F4
3921	F7
3922	F11
3923	G11
3924	G1
3925	H9
3926	G2
3927	G4
3928	G7
3929	I11
3930	I1
3931	I2
3932	I4
3933	I7
3934	F2
3935	F5
3936	G2
3937	G5
3938	I2
3939	I5
3940	G9
3941	E6
3942	F6
3943	F6
3944	F6
3945	F6
3946	F6
3947	G6
3948	H6
3949	H6
3950	I6
3951	I6
3952	I6
3953	I6
3954	I6
3955	I12
3956	I12
4900	H12
4901	H12
4902	G10
4903	D7
4904	E6
4905	F7
4906	H6
4907	I7
4908	G13
4909	G13
4910	G13
4911	E10
5901	G9
5902	H13
5903	I13
5904	I11
5905	E10
5906	E10
5907	F4
5908	F1
5909	F10
5910	G1
5911	G4
5912	H1
5913	H4
5914	F10
5915	F10
5916	H13
7900	E9
7901	F9
7902	G11
7903	I10
7904	D2
7905	H10
7906	F8
7907	F2
7908	G2
7909	G8
7910-1	F6
7910-2	H6
7911	I2
7912	I8
F1902	G12
F1903	G12
F1904	G12
F1907	F12
F1909	F12
F1911	F12
F1912	F12
F1914	E12
F1916	E12
F1918	E12
F1920	D12
F1921	D12
F1922	E13
I900	B12
I901	B12
I902	F2
I903	G2
I904	H2
I905	F1
I906	G1
I907	H1
I908	A12
I909	B14
I910	A12
I911	A12
I912	B12
I913	C12
I914	C12
I915	C12
I916	D12
I917	D12
I918	G9
I919	H13
I920	I13
I921	F4
I922	F5
I923	G4
I924	G5
I925	H4
I926	H5
I927	A2
I928	B2
I929	A1
I930	B1
I931	C1
I932	C1
I933	D1
I934	A3
I935	A3
I936	A3
I937	A3
I938	B3
I939	B3

Digital Board Chrysalis 2.1: VIPs



1000	B2
1001	G9
2000	B3
2001	B3
2002	B3
2003	B4
2004	A2
2005	A2
2006	A2
2007	A2
2008	A3
2009	A3
2010	A3
2011	A3
2012	A3
2013	A4
2014	H7
2015	A10
2016	A12
2017	A12
2018	A12
2019	A13
2020	A13
2021	B12
2022	A13
2023	B2
2024	A1
2025	D2
2026	A10
2027	B12
2028	B12
2029	B13
2030	B13
2031	B13
2032	B14
2033	B14
2034	C2
2035	A11
2037	B9
2038	B12
2039	B13
2040	B13
2041	B13
2042	B14
2043	B14
2044	B14
2045	B2
2047	D2
2048	B7
2049	B10
2050	B11
2051	C2
2052	D8
2053	D8
2054	D8
2055	D1
2056	E8
2057	C1
2058	E8
2059	H9
2060	H9
2061	A9
2062	H13
2063	E7
2064	E8
2065	E7
2066	C9
2067	H6
2071	E8
3000	A8
3001	E2
3002	E2
3003	C9
3004	B7
3005	C13
3006	C8
3007	C2
3008	C13
3009	C7
3010	E14
3011	F10
3012	G9
3013	G9
3014	E2
3015	G2
3016	G2
3017	G2
3018	I2
3019	E14
3020	F2
3022	D2
3023	A10
3024	A10
3025	A10
3026	B9
4001	F9
4002	G8
4003	C9
4004	D2
4005	G12
4007	C8
5001	A14
5002	A2
5003	A1
5005	A14
5008	B14
5009	B10
5010	A8
5011	H13
6000	B7
7001	H7
7002	A8
7003	B7
7004	C8
7005	B4
7008-1	H11
7008-2	H12
7112	F2
F001	F10
F002	F10
F003	C13
F004	E14
F005	E14
F006	E14
F007	E14
F008	F9
F009	F9

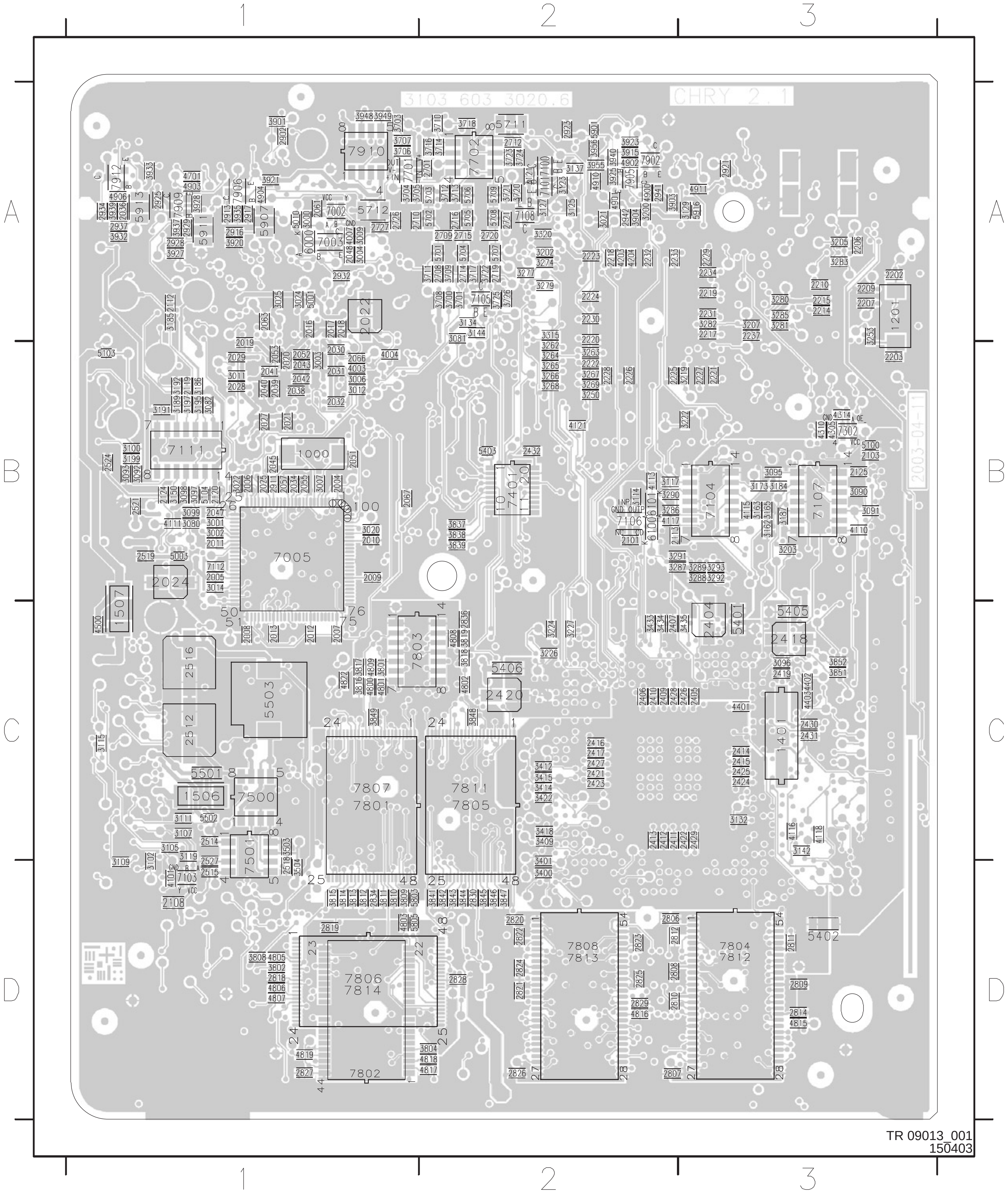
Layout Digital Board Chrysalis 2.1 (Top View)



TR 09012_001
150403

0605	D1
0609	D3
1001	A3
1100	C3
1102	C3
1103	A3
1104	A2
1105	C3
1106	B3
1200	A1
1203	A1
1400	C1
1500	B3
1505	B3
1704	A2
1900	A1
1901	A2
1904	A3
2000	B3
2001	B3
2002	B3
2003	B3
2014	B3
2015	A3
2023	B3
2026	A3
2033	B3
2035	A3
2037	A3
2044	B3
2046	A1
2049	B3
2050	B3
2054	A3
2056	A3
2058	A3
2059	A3
2060	B3
2062	B3
2064	A3
2065	A3
2071	A3
2100	D3
2102	C3
2104	C3
2105	C3
2106	C3
2107	C3
2109	C3
2110	C3
2111	C3
2116	D3
2127	D2
2128	D3
2200	A1
2201	A1
2204	A1
2205	A1
2212	B1
2235	A1
2236	A1
2238	B1
2300	B1
2301	B1
2302	B2
2303	B1
2304	B1
2305	B1
2306	B1
2307	B1
2308	B1
2309	B1
2310	B1
2311	C1
2312	B1
2400	D2
2401	D2
2402	C2
2403	D2
2408	D1
2433	C1
2435	C2
2525	B3
2526	B3
2700	B3
2703	A2
2704	B2
2705	B2
2706	A2
2707	A3
2711	A2
2717	A2
2722	A2
2723	A2
2724	A2
2725	A2
2728	A2
2729	A2
2832	D2
2833	D2
2900	A3
2901	A3
2903	A3
2904	A3
2905	A3
2906	A3
2907	A3
2908	A3
2909	A3
2910	A2
2912	A3
2914	A3
2915	A3
2918	A2
2919	A1
2920	A2
2922	A2
2924	A3
2926	A3
2927	A3
2930	A1
2931	D3
2933	A3
2935	A3
2936	A3
2938	D3
2939	A3
2940	A3
3005	B3
3008	B3
3010	B3
3013	A3
3015	B3
3016	B3
3017	B3
3018	B2
3019	B3
3023	A3
3026	A3
3085	C1
3086	C1
3087	A1
3088	C1
3094	C3
3101	C3
3103	C3
3104	D3
3106	C3
3108	C3
3110	C3
3112	C3
3113	D2
3116	C3
3118	C3
3120	C3
3122	C3
3124	C3
3126	C3
3128	C3
3130	C3
3131	C3
3133	C3
3135	C3
3136	C3
3138	C3
3139	C3
3140	C3
3141	C3
3143	C3
3145	C3
3147	C3
3149	D3
3152	C3
3154	D3
3156	D3
3157	C3
3159	D3
3161	D3
3164	D3
3167	D3
3168	D3
3170	D3
3172	D3
3175	D3
3176	D3
3178	D3
3180	D3
3204	B1
3206	A1
3208	B1
3209	A1
3210	B1
3211	B1
3212	A1
3213	A1
3214	B1
3215	B1
3216	A1
3217	B1
3218	B1
3220	B1
3221	B1
3223	A1
3225	B1
3228	B1
3229	B1
3230	A1
3231	B1
3232	A1
3233	A1
3234	A1
3235	B1
3236	B1
3237	B2
3238	B1
3239	B2
3240	A1
3241	B2
3242	B1
3243	B2
3244	B2
3245	B1
3246	B2
3247	B2
3248	A1
3249	B2
3251	B2
3252	B2
3254	B2
3255	B2
3256	B2
3257	B1
3258	B2
3259	B2
3260	A2
3261	A1
3270	A2
3271	A2
3272	A2
3273	A2
3275	B2
3276	A2
3278	A2
3284	A1
3294	A2
3295	A2
3296	A2
3297	A2
3298	A2
3299	B2
3300	B1
3301	B1
3302	B1
3303	B1
3304	B1
3305	B1
3306	B1
3307	B1
3308	B1
3309	B1
3310	B1
3311	B1
3316	B2
3317	B2
3318	B2
3319	B2
3402	D2
3403	C2
3404	C2
3405	D2
3406	D2
3407	C2
3408	C2
3410	C2
3411	C2
3413	C2
3416	C2
3417	C2
3419	C2
3420	C2
3421	C2
3423	C2
3424	C1
3425	C1
3426	C1
3427	C1
3428	C1
3429	C1
3430	C1
3431	C1
3432	C1
3436	C1
3437	C1
3438	C1
3439	C1
3440	C1
3442	D2
3443	D1
3444	D1
3445	D1
3446	D1
3447	D2
3448	D2
3449	D2
3450	D2
3451	D2
3452	D1
3453	D2
3454	D2
3455	D2
3456	D2
3457	D2
3458	D2
3459	D2
3460	D2
3461	D2
3462	D2
3463	D2
3464	D2
3465	D2
3466	D2
3467	D2
3468	D2
3469	D2
3470	D2
3471	D2
3472	D2
3473	D2
3474	D1
3475	D1
3476	D1
3477	D1
3478	D1
3479	D1
3480	D1
3481	D1
3482	D1
3483	D1
3484	D1
3485	D1
3486	D1
3487	D2
3488	D2
3489	D2
3490	D2
3491	D2
3492	D2
3493	D1
3494	D2
3495	D2
3496	D2
3497	C1
3498	C1
3499	C1
3702	B2
3715	A2
3719	A2
3727	A3
3805	C2
3806	D2
3807	D2
3820	B1
3821	B1
3822	B1
3823	B1
3824	B2
3825	B2
3826	B2
3827	B2
3828	C1
3829	C1
3830	C1
3831	C1
3832	C2
3833	C2
3834	C2
3835	C2
3836	C2
3840	C1
3850	C1
3853	C1
3854	A3
3855	D2
3902	A3
3905	A3
3906	A3
3907	A3
3908	A3
3909	A1
3910	A1
3911	A3
3912	A3
3913	A1
3914	A1
3916	A1
3917	A2
3918	A3
3919	A3
3922	A2
3924	A3
3926	A3
3929	A2
3930	A3
3931	A3
3934	A3
3936	A3
3938	A3
3941	A3
3942	A3
3943	A3
3944	A3
3945	A3
3946	A3
3947	A3
3950	A3
3951	A3
3952	A3
3953	A3
3954	A3
4001	B3
4002	B3
4005	B3
4119	C1
4122	D3
4123	D2
4201	B1
4202	A1
4205	A1
4300	B1
4301	B1
4302	B1
4303	B1
4304	C1
4306	B1
4307	C1
4308	B1
4309	B1
4311	B1
4312	B1
4313	B1
4315	B1
4316	C1
4404	B2
4405	B2
4406	B2
4407	B2
4702	A3
4703	A3
4728	A2
4729	A2
4730	A2
4804	C3
4812	C3
4813	C2
4814	C2
4905	A3
4907	A3
4908	A2
4909	A2
5002	B3
5005	B3
5008	B3
5009	B3
5011	B3
5102	D3
5108	D2
5200	A1
5201	B2
5202	A1
5203	A1
5204	B1
5300	B1
5301	B1
5302	B1
5400	D2
5404	C1
5700	B2
5710	A3
5802	D1
5804	D2
5808	D2
5809	D2
5902	A3
5903	A3
5904	A2
5905	A1
5906	A1
5908	A3
5909	A1
5910	A3
5912	A3
5914	A2
5915	A2
6103	D3
6200	B2
7001	B3
7004	B3
7008	C3
7102	D3
7200	A1
7201	A2
7202	B2
7300	B1
7301	B1
7303	C1
7304	C1
7305	B1
7400	C2
7402	C1
7703	A2
7809	C3
7810	D3
7900	A1
7901	A2
7903	A2
7904	A3
7907	A3
7908	A3
7911	A3

Layout Digital Board Chrysalis 2.1 (Bottom View)



TR 09013_001
150403

1000	B1	2409	C2	3007	B1	3291	B2	3956	A2	7107	B3
1201	A3	2410	C2	3009	A1	3292	B3	4003	B1	7108	A2
1401	C3	2411	C2	3011	B1	3293	B3	4004	B1	7111	B1
1506	C1	2412	C2	3012	B1	3315	A2	4007	A1	7112	B1
1507	C1	2413	C2	3014	B1	3320	A2	4101	D1	7302	B3
2004	B1	2414	C3	3020	B1	3400	D2	4110	B3	7401	B2
2005	B1	2415	C3	3021	A2	3401	D2	4111	B1	7500	C1
2006	B1	2416	C2	3022	B1	3409	C2	4113	B2	7501	C1
2007	C1	2417	C2	3024	A1	3412	C2	4115	B3	7701	A1
2008	C1	2418	C3	3025	A1	3414	C2	4116	C3	7702	A2
2009	B1	2419	C3	3080	B1	3415	C2	4117	B2	7801	C1
2010	B1	2420	C2	3081	A2	3418	C2	4118	C3	7802	D1
2011	B1	2421	C2	3082	B1	3422	C2	4121	B2	7803	C1
2012	C1	2422	C3	3090	B3	3433	C2	4203	A2	7804	D3
2013	C1	2423	C2	3091	B3	3434	C2	4204	A2	7805	C2
2016	A1	2424	C3	3092	B1	3435	C3	4305	B3	7806	D1
2017	A1	2425	C3	3093	B1	3503	C1	4310	B3	7807	C1
2018	A1	2426	C3	3095	B3	3504	D1	4314	B3	7808	D2
2019	B1	2427	C2	3096	C3	3700	A2	4401	C3	7811	C2
2020	B1	2428	C2	3097	B1	3701	A2	4402	C3	7812	D3
2021	B1	2429	C3	3098	B1	3703	A1	4403	C3	7813	D2
2022	A1	2430	C3	3099	B1	3704	A1	4500	C1	7814	D1
2024	B1	2431	C3	3100	B1	3705	A1	4701	A1	7902	A2
2025	B1	2432	B2	3102	D1	3706	A1	4800	C1	7905	A2
2027	B1	2512	C1	3105	C1	3707	A1	4801	C1	7906	A1
2028	B1	2514	C1	3107	C1	3708	A2	4802	C2	7909	A1
2029	B1	2515	D1	3109	D1	3709	A2	4803	D1	7910	A1
2030	B1	2516	C1	3111	C1	3710	A2	4805	D1	7912	A1
2031	B1	2518	D1	3114	B2	3711	A2	4806	D1		
2032	B1	2519	B1	3115	C1	3712	A2	4807	D1		
2034	B1	2521	B1	3117	B2	3713	A2	4808	C2		
2036	A1	2524	B1	3119	C1	3714	A2	4809	C1		
2038	B1	2527	D1	3121	A2	3716	A2	4815	D3		
2039	B1	2701	A2	3123	A2	3717	A2	4816	D2		
2040	B1	2708	A2	3125	A2	3718	A2	4817	D2		
2041	B1	2709	A2	3127	A2	3720	A2	4818	D2		
2042	B1	2710	A1	3129	A3	3721	A2	4819	D1		
2043	B1	2712	A2	3132	C3	3722	A2	4822	C1		
2045	B1	2714	A2	3134	A2	3723	A2	4900	A2		
2047	B1	2715	A2	3137	A2	3724	A2	4901	A2		
2048	A1	2716	A2	3142	C3	3725	A2	4902	A2		
2051	B1	2719	A2	3144	A2	3726	A2	4903	A1		
2052	B1	2720	A2	3150	B1	3801	C1	4904	A1		
2053	B1	2721	A2	3162	B3	3802	D1	4906	A1		
2055	B1	2726	A1	3163	B3	3804	D2	4910	A2		
2057	B1	2727	A1	3165	B3	3808	D1	4911	A3		
2061	A1	2806	D2	3173	B3	3809	D1	5001	A1		
2063	A1	2807	D2	3184	B3	3810	D1	5003	B1		
2066	B1	2808	D2	3185	A1	3811	D1	5010	A1		
2067	B1	2809	D3	3186	B1	3812	D1	5100	B3		
2101	B2	2810	D2	3187	B3	3813	D1	5103	B1		
2103	B3	2811	D3	3189	B1	3814	D1	5104	B1		
2108	D1	2812	D2	3191	B1	3815	D1	5401	C3		
2112	A1	2814	D3	3192	B1	3816	C1	5402	D3		
2113	B2	2818	D1	3195	B1	3817	C1	5403	B2		
2119	B1	2819	D1	3197	B1	3818	C2	5405	C3		
2120	B1	2820	D2	3199	B1	3819	C2	5406	C2		
2124	B1	2821	D2	3200	A2	3837	B2	5501	C1		
2125	B3	2822	D2	3202	A2	3838	B2	5502	C1		
2202	A3	2823	D2	3203	B3	3839	B2	5503	C1		
2203	B3	2824	D2	3205	A3	3841	D2	5701	A2		
2206	A3	2825	D2	3207	A3	3842	D2	5702	A2		
2207	A3	2826	D2	3219	B3	3843	D2	5703	A2		
2209	A3	2827	D1	3222	B3	3844	D2	5704	A2		
2210	A3	2828	D2	3224	C2	3845	D2	5705	A2		
2214	A3	2829	D2	3226	C2	3846	D2	5706	A2		
2215	A3	2830	D2	3227	C2	3847	D2	5707	A2		
2217	A3	2834	D1	3250	B2	3848	C2	5708	A2		
2218	A2	2836	C2	3253	A3	3849	C1	5709	A2		
2219	A3	2902	A1	3262	B2	3851	C3	5711	A2		
2220	A2	2911	B1	3263	B2	3852	C3	5712	A1		
2221	B3	2913	A1	3264	B2	3901	A1	5803	D1		
2222	B2	2916	A1	3265	B2	3903	A2	5805	D1		
2223	A2	2917	A1	3266	B2	3904	A2	5901	A2		
2224	A2	2921	A3	3267	B2	3915	A2	5907	A1		
2225	B2	2923	A2	3268	B2	3920	A1	5911	A1		
2226	B2	2925	A1	3269	B2	3921	A1	5913	A1		
2227	B3	2928	A1	3274	A2	3923	A2	5916	A3		
2228	B2	2929	A1	3277	A2	3925	A2	6000	A1		
2229	A3	2932	A1	3279	A2	3927	A1	6100	B2		
2230	A2	2934	A1	3280	A3	3928	A1	6101	B2		
2231	A3	2937	A1	3281	A3	3932	A1	7002	A1		
2232	A2	2941	A2	3282	A3	3933	A1	7003	A1		
2233	A2	2942	A2	3283	A3	3935	A1	7005	B1		
2234	A3	3000	A1	3285	A3	3937	A1	7100	A2		
2237	A3	3001	B1	3286	B2	3939	A1	7101	A2		
2404	C3	3002	B1	3287	B2	3940	A2	7103	D1		
2405	C3	3003	B1	3288	B3	3948	A1	7104	B3		
2406	C2	3004	A1	3289	B3	3949	A1	7105	A2		
2407	C2	3006	B1	3290	B2	3955	A2	7106	B2		

8. Alignments

8.1 Alignment Instructions Analog Board

Test equipment:

1. Dual-trace oscilloscope
   Voltage range : 0.001 ~ 50 V/div
   Frequency : DC ~ 50 MHz
   Probe : 10:1, 1:1

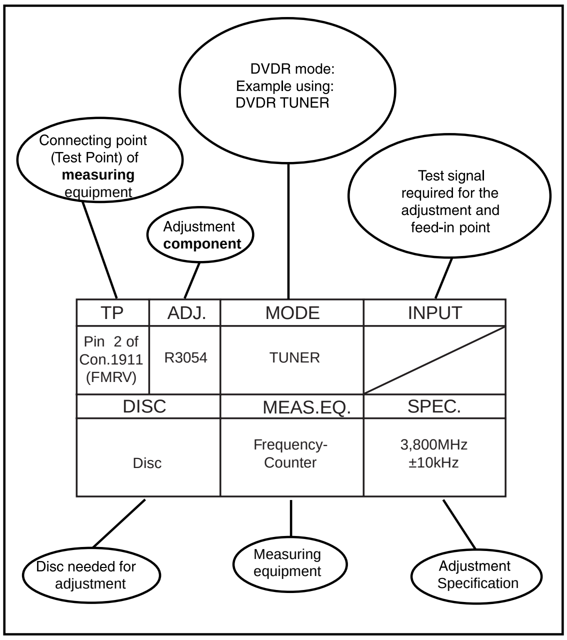
2. DVM (Digital voltmeter)

3. Frequency counter

4. Sinus generator
   Sinus : 0 ~ 50 MHz

5. Test pattern generator

How to read the adjustment procedures:



Front End (FV)

Service tasks after replacement of IC 7710, coil L5710 and L5711:

1 AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:
Bad or disturbed TV channel reception.

PAL - AFC adjustment [5711]:

TP	ADJ.	MODE	INPUT
IC 7710 Pin 17 (F708)	L5711	TUNER	38,9MHz 500mV$_{pp}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,1V

Storage in NVRAM via command mode interface of DSW:

After adjustment, the AFC reference value has to be stored in the NVRAM.
This reference value is 256 * measured voltage/Ucc. Ucc is 5.0V.
Store the reference value via command 732 , followed by the ref. value.
Example: DD:> 732 128

2 HF - AGC adjustment [3724]:

Service tasks after replacement of IC 7710:

Purpose: Set amplifier control.

Symptom, if incorrectly set:
Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1705 Pin 11 (F710, IF-out)	R3707	Set tuned to channel 25 503.25 MHz	5mV(74dBµV) on aerial input PAL white picture, audio IF on, no modulation
DISC		MEAS.EQ.	SPEC.
		Oscilloscope Video Pattern Generator	500mV$_{pp}$ +/-0.5dB (use a 10:1 probe)

3 Attenuating the 40.4 MHz [5710]: (SECAM only)

Service tasks after replacement of coil 5710:

Purpose: To attenuate the band I carrier rests.

Symptom, if incorrectly set:
Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1701 Pin 1 (F709)	L5710	TUNER	40.4 MHz, 200mV$_{rms}$ at Tuner 1705, Pin 11 (F710, IF-out)
DISC		MEAS.EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of OFW [1701] must be smaller than the input signal amplitude by at least 6 dB.

Figure 8-1

8.2 Reprogramming Procedure of NVM on the Microprocessor Sub PCB

The NVM, item 7808, on the Microprocessor Sub board contains the following factory settings:

1. Clock correction factor
2. AFC reference value
3. Slash version

The settings 1,2 and 3 are stored in the NVM during the production of the analogue board.
The slash version is stored at the end of the production line of the set.
In case of failure, the NVM must be replaced by an empty device. By way of commands via the Diagnostic Software or via ComPair, the factory settings must be restored in the NVM.

8.2.1 Clock Correction Adjustment

To guarantee an exact function of the real time clock, an adjustment of the clock frequency is possibe. The adjustment value is stored in the NVM.
Procedure:

- put the set in service command mode
- execute command 1117 to initiate that a signal with 32768 Hz is available on pin 3 of connector 1988
  example:
  DD:>1117
- measure the frequency fmeas of the Clock Crystal with an accuracy of 0.1 Hz.
- Calculate the parameter to be entered: 32768/fmeas * 106
- Normally the parameter must be between 999902 and 1000097. If the parameter and therefore the frequency of the crystal is outside this range, the crystal must be replaced.
- Execute command 1118 with the parameter as input
  example:
  DD:>1118 1000023

8.2.2 AFC Reference Voltage Tuner

This function stores the reference voltage for the tuner in the NVM. Before this value can be stored, the AFC adjustment, described in the adjustment instructions of the analogue board, must be carried out.
Procedure:

- Adjust AFC circuit
- Calculate the reference value
- Execute command 1119 and use the calculated reference value as parameter example: DD:>1119 128

8.2.3 Slash Version

The slash version is stored with command 1217, followed by the slash version as parameter.
The slash versions used in DVDR77 are the following:

DVDR77/00/02:	71
DVDR77/05:	72
DVDR77/17:	166

Example:
DD:>1217 65

Reset of Slash Version
Use command 1115 to reset the analogue board to the default setting.
Procedure:

- Put the set in DSW command mode
- Execute command 1115 with the following parameters:
  DD:> 1115 w 0xAE 2 0xD0 0x00
- Leave the DSW command mode and start up the set in application mode
  No background is visible on the TV screen. The analogue board is ready to accept the appropriate slash version

8.3 Rework Procedure IEEE Unique Number

8.3.1 Scope:

The procedure describes how to upgrade sets with a unique number after repair. This unique number is stored in the NVRAM (item 7809) of the digital board at the end of the production line.
This procedure is only valid or necessary when:

- The digital board is replaced
- NVRAM on the digital board is replaced
- NVRAM is cleared

In all other cases the repaired set retains its unique number.
The procedure defines several means to re-assure the unique number depending on the possibilities of repair or the state the faulty set is in.

8.3.2 Handling:

State of original (defective) board:

1. The digital board starts up in Diagnostics Mode: follow procedure A to retrieve the valid unique number
2. The digital board does NOT start up in Diagnostics Mode: follow procedure B.

8.3.3 Procedure A

1. Connect defective digital board to PC via serial cable (3122 785 90017)
2. start up hyper terminal or any other serial terminal via the correct settings (DSW command mode interface)
3. read out existing unique number via nucleus 1208
   example:
   ```
   DD:> 1208
    120800: DV Unique ID = 00D7A1FC6C Test OK @
   ```
4. note read out
5. program new digital board via nucleus 1207
   example:
   ```
   DD:> 1207 00D7A1FC6C 120700: Test OK @
   ```

The set has now the original unique number

8.3.4 Procedure B

1. Note the serial number of the set example:
   VN050136130156
   - VN = production centre (VN....Szekesfehervar).
     According to UAW-500: V=22 and N=14
   - 05 = change code (this is not used for this calculation)
   - 01 = YEAR
   - 36 = Production WEEK
   - 130156 = Lot and SERIAL number
2. Calculate the unique number: this number always exists out of 10 hexadecimal numbers.
3. First 5 numbers: First we calculate a decimal number according to the formula below:
   35828*YEAR + 676* WEEK + 26*V + N+ 8788
   The figures are fixed, YEAR + WEEK + factory code (V+ N) are variable
   Example: 35828*01+676*36+26*22+14+8788 = 69538 (decimal)
   Then we translate the decimal number to a hexadecimal number. example: 69538 (decimal)= 10FA2 (hex)
4. Last 5 numbers: The last 5 numbers exist out of the Lot and SERIAL number according formula below:
   serial nr + 1 * 100000
   Example: 130156 + 100000 = 230156 (decimal)
   230156 (decimal) = 3830C (hex)
5. Program new digital board via nucleus or 1207. Therefore we use the 10 hexadecimal numbers we calculated above:
   example:
   ```
   >1207 10D7A3830C
   12700: Test OK @
   ```

The set has now its original unique number

8.4 Alignments after replacing the Boot EEPROM 7810 in sets with Digital Board Chrysalis

The NVM, item 7810, on the Digitalt Board Chrysalis contains the “Diversity String” that tells the software during startup which hardware version is present.
The setting is stored in the NVM during the production of the Digital Board Chrysalis
In case of a fault the NVM must be replaced by a programmed device containing the boot script.
Via the Diagnostic Software the Diversity String is stored with command 1226, followed by the Diversity String as parameter.

The diversity strings used in DVDR77/0x1 are the following:

Chrysalis Board Type	String
E4	4442484962142001453400000000000027030300000101020001000040080000
E4+	44424849CB40200145342B000000000027040300000101020001000040080000

Example:

```
DD:> 1226 44424849A8E92001453100000000000000230303
00000101020100000020040000
122600
Test OK @
```

E4...Digital Board Chrysalis version Euro 4
E4+...Digital Board Chrysalis version Euro 4 Plus; with Chrysalis Version C2.

With command 1228 the settings can be displayed.

9. Circuit-, IC descriptions and list of abbreviations

9.1 Display Board

9.1.1 Microcontroller

The core element of the Display Control unit is the microcontroller TMP87CH74AF [7103]. The TMP87CH74AF is an 8 bit microcontroller fitted with 32kB ROM and 1kB RAM. It requires 5V supply and is responsible for the following functions:

- Interface to Central Controller-P
- Evaluation of the keyboard matrix
- Decoding the remote control commands from the infra-red receiver
- Activation and control of the local display
- Heater voltage generation

The 8 MHz resonator (Pos. 1110) generates the system clock. The reset is generated by the CC-P via “POR_DC”-signal where the transistor [7104] is used as a level-shifter from 3V3 to 5V.

9.1.2 Interface to the Central Control µP

The communication to the main microcontroller (CC) on the P-Sub-PCB is done via I2C-Interface, where the TMP87CH74AF acts in slave-mode.
An additional wire (“INT”-line) is used to signal the Central controller that data are ready, e.g. when a key has been pressed.

9.1.3 Evaluation of the keyboard matrix

There are 12 different keys on the display board. A resistor network is used to generate a specific direct voltage value, depending on the pressed key. Via the resistors 3107 and 3102 on the analog/digital (A/D) ports (7103 pin 36 and 37) the evaluation is done.

9.1.4 IR receiver and signal evaluation

The IR receiver [7107] contains a selectively controlled amplifier as well as a photo-diode. The photo-diode changes the received infra red transmission (approx. 940nm) to electrical pulses, which are then amplified and demodulated. On the output of the IR receiver [7107], a pulse sequence with TTL-level, which corresponds to the envelope curve of the received IR remote control command, can be measured. This pulse sequence is fed into the controller for further processing via port TC1 [7103, pin20].

9.1.5 Vacuum Fluorescence Display

The VFD “BJ900GNK” [POS 7100] is fully controlled by the microcontroller. The µC also includes the driving stages. Only two additional drivers [POS 7101 and 7102] are necessary for the grids 8 and 9 because of their large size.

9.1.6 VFD Heater Voltage Generator

The circuit around POS [7106, 7108 and 7109] is used to generate a proper AC-Voltage for the filament of the VFD. For this the microcontroller generates an appropriate rectangular signal with 50% duty-cycle and a frequency of 30 kHz at pin 19. Pos. [5104] and [2113] are acting as a resonance-circuit. Via Zener-Diode (POS[6100]) and resistors [3119, 3122 and 3123] the two heater-pins of the VFD (“FIL1” and “FIL2”) are clamped so that the grids and segments can be fully switched off.

9.1.7 REC-LED

The REC-LED-ring is made with 3 red LED, controlled via pin 3 (only for flashing) and pin 12 for on/off switching, of the microcontroller. The POS [7105] is used as a driver for the led.

9.1.8 EPG-LED

The EPG led is a white led and controlled from the pin 14 from the microcontroller. The POS [7110] is used as a driver for the led.

9.1.9 TRAY-LED

There are 6 leds (chip) necessary to illuminate the tray, these 6 leds are located on a little sub-pcb connected over a 4 pin connector POS [1911] from the DC-print. The leds are controlled from pin 11 of the microcontroller.

9.2 Microcontroller Sub Board (UP SUB Board)

9.2.1 General

This small PCB is directly soldered in on top of the Analogue-Board.
It is used with no diversity in all three different basic versions (Europe, NAFTA and APAC-Pal). Only the software being loaded into the external Flash-memory is not the same.

9.2.2 Microcontroller

The main part of the Sub-PCB is the central controller (CC) µP [7804] TMP91CW12AF, which is a 16-bit CPU with 128kBROM and 4kB RAM.
It works with a 3V3 supply and a system clock of 24,576MHz [1801].
The 3V3-supply is made out of the “5VSTBY” by the circuit around [7816].
After connecting the set to the mains (power-up) the IC [7806] generates a reset pulse. This signal (“IPOR”) is directly fed to first priority interrupt input (pin 63) for power fail detection and also to the Reset-Input of the CC (Pin30) via [7802], which is necessary to generate a reset only during power-up. In case of power fail pin 30 of the CC must be kept high (3V3).
The internal memory of the CC is too small for all necessary demands. Therefore an external Flash-ROM [7805] with 1MByte in size and a RAM [7803] with 128kByte are necessary. Both parts are connected to the µP via a parallel address-/data-bus. The lower eight bus-lines (AD0 to AD7) are multiplexed by [7801] and the “ALE”-signal of the CC.
For updating of the software the external Flash-ROM can be reprogrammed by the µP. During this process [7807] is switched on by the “WE”-signal.
When no mains is connected, the CC is supplied via Gold-Cap [2816] during the power backup period. The diode [6802] prevents unwanted current consumption of other components.
The internal ROM of the µP holds the program code for the Real-Time-Clock. Only the microprocessor is supplied by the backup cell, not the external memories and the µP operates in a low frequency mode with the clock crystal [1805] only (32.768 kHz). To adjust the clock the frequency can be measured at pin 87 of the µP in a special test-mode.

9.2.3 Control-Interfaces

The CC is communicating with the digital board via a serial connection, which operates at a speed of 19,4 kbit/s (“D_DATA”-, “A_DATA”, “D_RDY”- and “A_RDY”-signal on

[1986]). By generating a high level on pin 16 of the CC the digital PCB can be reset (inverter [7817] in between).
Most of the other parts are controlled by the µP via I2C-bus (“SDA”- and “SCL”-signal). The FETs [7821] and [7822] are used for adaptation of the 3V3-level on CC-side to the components supplied with 5V.
The CC can also reset the display-board-µP by pulling pin 39 to high.
The transistor [7819] acts as a level shifter for the “INT”-signal.
In the European sets a bi-directional interface is established between the recording unit and the TV device at pin 10 of the Scart (“P50”-line/Easy Link). The processing is done via pin 14 (output) and pin 38 (input) of the CC and the circuit around [7813], [7814] and [7815].

9.2.4 EEPROM

The EEPROM M24C16 [7808] is an electrical erasable and programmable, non-volatile memory. The EEPROM stores data specific to the device, such as the AFC-reference value of the Europe IF-part, the clock-correction-factor, etc. It is accessed by the µP via the I2C-bus.

9.2.5 Sync Separator

To detect whether a video signal is available or not a separate IC [7825] is used to extract the sync information out of the video signal that is also routed to the digital board for recording.
While on the input a low-pass-filter ([2823] and [3869]) limits the bandwidth an additional filter (circuit
around [7818]) on the output avoids distortions. Afterwards the sync-signal is routed to pin11 of the CC.

9.2.6 Fan Control

To avoid unwanted temperatures inside the set (especially the Laser on the OPU of the drive is very sensitive) a fan is located on top of the basic engine. The speed control is dependent on the ambient temp. A NTC resistor [3134] located on the display board measures the temperature. An operational amplifier [7902-B] generates a proper voltage, which is then fed to the engine (“BE_FAN”-line). Below 28°C ambient temp. the fan-voltage is approx. 5V and is increased to 10V when the ambient temperature goes up to approx. 38°C. The second part of the Op-Amp. [7902-A] prevents damage of any temperature-sensitive part in case the NTC or the wire in between is damaged. It acts as a comparator and pulls the “BE_FAN”-signal to 10V. As the fan has to be stopped in case the tray of the drive is open this voltage is “killed” by the CC (“FAN_OFF”-signal). The double-diode [6901] acts for both Op.-Amp.-circuits. The circuit is also prepared for a set-fan (circuit around the Op-Amp. [7902-C]).

9.3 Analog board Europe

9.3.1 General

This PCB consists out of the following parts:
- Power-Supply-Unit
- Frontend (Audio & Video)
- Input-/Output-switching
- Audio ADC- & DAC-processing
- VPS/PDC- and Text-Data slicer
- Analog Follow-Me Circuit

All functional groups are either controlled via I2C-bus or via separate signal lines by the Central-Controller on the µP-Sub-Board. This sub board is directly soldered in onto the analog PCB. During Stand-By mode of the set, several parts are not supplied (Tuner, MSP, ...). The microprocessor is running and maintains the clock of the set.
To avoid bus blockades the I2C-bus (“SCLSW” & “SDASW”) to/from these units is decoupled via transistors [7419], [7420] from the general bus (“SCL” & “SDA”).

9.3.2 Power Supply Unit

Functional principle:
This power supply works in the way of a flyback converter. In the mains input part [1931 to 2309], the mains voltage is rectified and buffered in the capacitor [2309]. From this direct voltage at [2309] energy is transferred into the transformer [5300, pins 7-5] during the conductive phase of the switching transistor [7307] and is stored there as magnetic energy. This energy is passed to the secondary outputs of the power supply in the blocking phase of the switching transistor [7307]. With the switch-on time of the switching transistor [7307], the energy transferred in every cycle is regulated in such a way that the output voltages remain constant regardless of changes in the load or mains voltage. The power transistor is driven by the integrated circuit [7313].

Mains input part:
The mains input part extends from the mains socket [1931] to the capacitor [2309]. The diodes [6301, 6302, 6305 and 6306] rectify the AC supply voltage, which is then buffered by the capacitor [2309]. The common mode coil [5302] and capacitor [2302] work as a filter to block interference arising in the power supply from the mains. Components [1302], [3306] and [3304] protect the power supply against short-term over voltages in the mains, e.g. caused by indirect lightning.

Start-up with Mains-on:
After connecting the power cord to the mains, the capacitor [2325] is loaded via a current source between pin 8 and pin 1 in the IC [7313]. Once the voltage on [2325] and therefore the supply voltage Vcc of the IC [7313] has reached approx. 11V, the IC starts up and provides pulses at its output pin 5. These pulses are used to drive the gate of the power transistor [7307]. The frequency of these pulses is depending on load and mains voltage. The current consumption of the IC is approx. 5 mA at Vcc in normal mode.
If Vcc drops to below approx. 9V (e.g. with power limitation) or if Vac exceeds approximately 16V (e.g. interruption of the control loop), the output of the IC [7313, pin 5] is blocked and a new start-up cycle begins. (See also “Overload, Power Limitation, Burst Mode“ section)

Normal operation:
With the power supply in normal mode, the periodic sequences in the circuit are divided primarily into the conductive and blocking phase of the switching transistor [7307]. During the conductive phase of the switching transistor [7307], current flows from the rectified mains voltage at capacitor [2309] through the primary coil of the transformer [5300, pins 7-5], the transistor [7307] and resistors [3321, 3352] to ground. The positive voltage on pin 7 of the transformer [5300] can be assumed as constant for a switching cycle. The current in the primary coil of the transformer [5300] increases linearly. A magnetic field representing a certain value of the primary current is formed inside the transformer. In this phase, the voltages on the secondary coils are polarized such that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] block. From the controller [7315] a current is supplied into the CTRL input on the IC [pin 3, 7313] via optocoupler [7314]. Once the switch on time of the switching transistor [7307] - that corresponds to the current supplied into the CTRL input - has been reached, the switching transistor [7307] is switched off.
When the switching transistor has been switched off, the blocking phase begins. No more energy will be transferred into the transformer. The inductivity of the transformer will still attempt to keep the current flowing at a constant level (U=L*di/dt). Switching off transistor [7307] interrupts the primary current circuit. The polarity of the voltages on the transformer is reversed, which means that the diodes [6300, 6303, 6307, 6308, 6310, 6313, 6317 and 6319] become conductive and current flows into the capacitors [2305, 2312, 2319, 2322, 2326 and 2328] and the load. This current is also ramp-shaped (di/dt negative, therefore decreasing).

The feedback control for the switched-mode power supply is done by changing the conductive phase of the switching transistor so that either more or less energy is transferred from the rectified mains voltage at [2309] into the transformer. The regulation information is provided by voltage reference [7315]. This element compares the 5V-output voltage via voltage divider [3332, 3333, 3334] with an internal 2.5V reference voltage. The output voltage of [7315] passes via an optocoupler [7314] for insulation of primary and secondary parts as a current value into pin 3 on the IC [7313]. The switch-on time of the transistor [7307] is inversely proportional to the value of this current.

Overload, power limitation, burst mode:

With increasing load on one or more of the power supply outputs, the switch-on time for the power transistor [7307] increases, and thus also the peak value of the delta-shaped current through this power transistor. The equivalent voltage of this current profile is passed from resistors [3321] and [3352] via [3365] to pin 5 of the IC [7313]. If the voltage on pin 2 reaches approx. 0.4V in one switching cycle, the conductive phase of the switching transistor is ended immediately. The check is done in each individual switching cycle. This process ensures that no more than approx. 60W can be taken out from the mains (= power limitation).

If the power supply reaches the power limit, the output voltages and the supply voltage Vcc on pin 1 of the IC [7313] will be reduced following further loading. If Vcc is less than approx. 9V at any point during this process, the output of the IC [7313, pin 6] is blocked. All output voltages and Vcc decrease and a new start-up cycle begins. If the overload status or short-circuit remains, the power limitation will be activated immediately and the voltages will again decrease, followed by another start-up cycle (Burst Mode). The amount of power taken up from the mains in burst mode is low.

Standby modes:

In the ‘AV-Standby‘ operating mode of the set, the ’ION‘ control line is primarily used to switch off all output voltages for Basic Engine and Digital Board (supplies 3V3, 5V, 12V, 5N and 4V6 at Connectors 1932 and 1933) of the power supply. This reduces the amount of power taken from the mains. In Low Power Standby mode additionally the ‘STBY’ control line is used to switch off output voltages 5SW and 8SW. This reduces power consumption to less than 3W, if additionally the display is switched off. The power supply will continue operating in Standby mode with a switching frequency of approx. 25 kHz.

9.3.3 Frontend

This unit is designed to support two basic versions, which are distinguished by a different assembly variant only (one for multistandard and the second for Pal-I only) and comprises the following parts:

- Tuner UV1316K [1705]
- IF amplifier & video demodulator IC TDA 9818/9817 [7710]
- Sound processor MSP3415G [7600]

Tuner and IF selection

The Tuner [1705] converts the RF-signal coming from the antenna input to an IF-signal. The tuner is fully controlled via I^2C-bus of the CC-µP. [1705] is also equipped with a “passive-loop-through” between antenna-in and -out to save power in stand-by of the set, when the complete part is not supplied. The IF frequency of the video carrier is 38.9 MHz for all systems except SECAM L' (34,0 MHz).

A quasi-split audio system is used. Separate surface-wave filters (SAW) are required. [1701], [1703] for video, [1702] for audio. [1701] is switched into the signal path for DK/I-SECAM L/L' reception, if the signal “SFS_TS” is “high”. In this case the switches [7704], [7705] are open and the diode [6703] is conducting. [1703] is switched into the signal path for BG reception (“SFS_TS” is “low”). Then the switch [7712] is open and the diode [6704] is conducting. For DK/I-SECAM L/L' reception, an additional circuit for suppressing the audio carrier of the adjacent channel is used. This circuitry is adjusted by coil [5710] for maximum suppression at 40.4MHz.

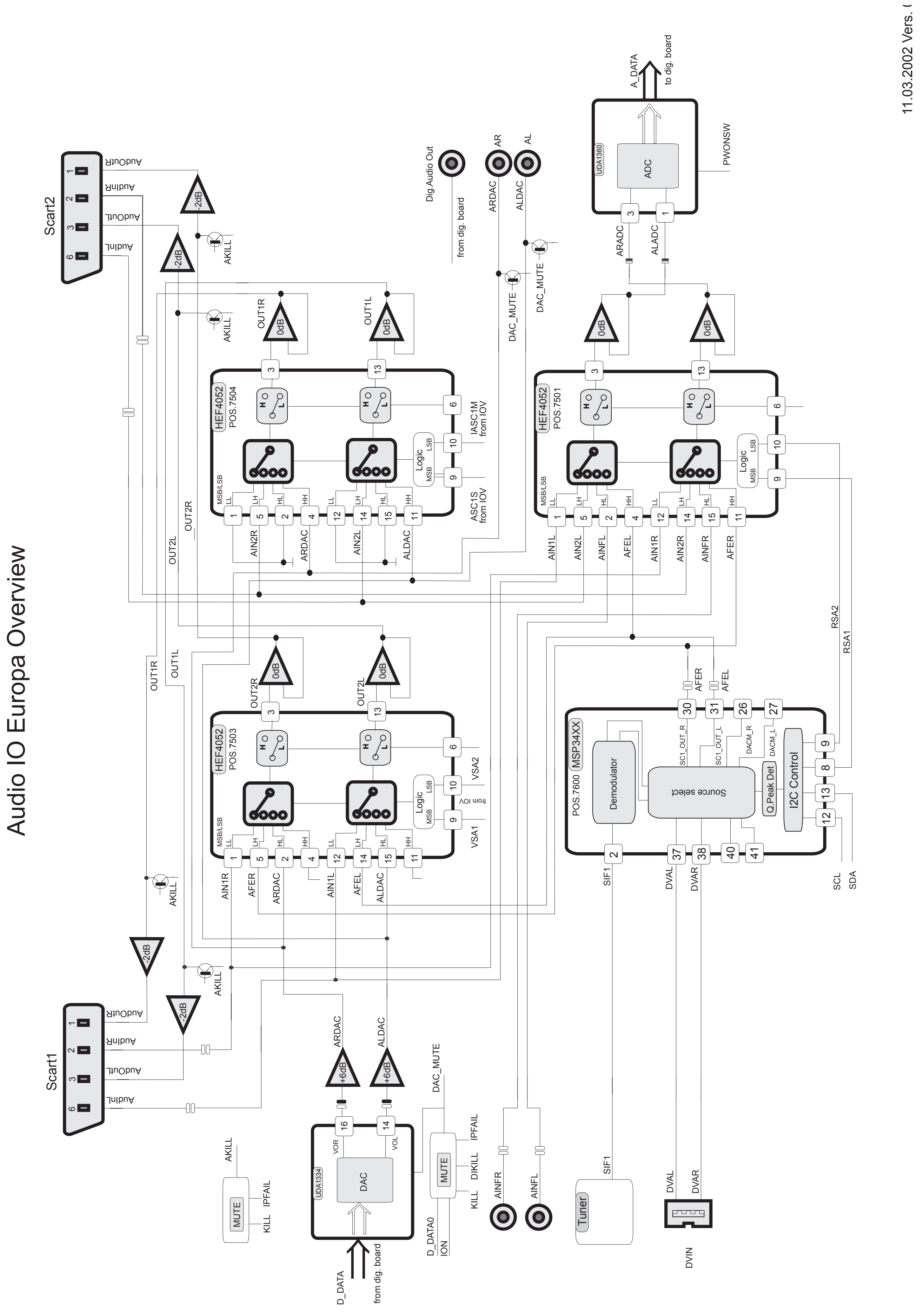
IF demodulator

The signal from the tuner and IF-selection circuit is processed by the demodulator IC TDA 9818/9817 [7710]. The signal “PSS” to pin 3 switches between demodulation of positive (SECAM only) or negative modulated video carriers. A QSS-audio-IF signal SIF1 is generated for demodulation in the sound processor [7600]. The audio-IF carrier is selected in the audio SAW filter [1702]. This filter is switched for SECAM L’. If the signal “SB1” is “high”, the switch [7714] is closed and the diode [6705] is not conducting. For all other standards the diode [6705] is conducting and the switch [7714] is open. The output signal of this SAW filter is firstly processed in the TDA 9818. Audio carriers are converted from the tuner IF level to the audio IF position and further processed in the audio demodulator [7600]. The AFC coil [5711] on the TDA 9818/9817 is adjusted so that when a frequency of 38.90 MHz is supplied to the IF output of the tuner, the AFC voltage on pin 17 of [7710] is 2.5V. The setting of the picture carrier frequency for SECAM L in the TDA 9818 is achieved by connecting pin 7 of the IC via a resistor [3710] to ground. The switch [7701] and the signal “SB1" do this. The HF-AGC is set using the potentiometer [3724] so that, with a sufficiently large antenna input signal (74 dBµV), the voltage at the IF output of the tuner [1705] pin 11 is 500 mVpp. This setting must be carried out when the audio carrier is switched off. The demodulated video signal appears on pin 16 of [7710]. The AGC voltage at pin 4 is used to determine the antenna signal strength after a buffer [7717] with the signal “AGC” and an analog input port of the CC-P. The trap [1704] reduces the sound carrier remainders in the video for BG standards. The trap [1706] works in the same way for the Pal-I standard only. For all other standards the switch [7713] is closed via [7706] and “SFS_TS”-line set “high" to bypass this trap. In these cases the selectivity of the SAW filter [1701] is sufficient. The coil [5713] for non-BG standards realizes a frequency response correction. This correction is not desired for SECAM L' and therefore short-circuited by [7716] (signal SB1 is “high” and [7702] has on-status). The demodulated video signal “VFV” is available after the buffer and limiting stage for noise peaks [7711]. The FM-PLL demodulator function of TDA 9818 is not necessary and therefore deactivated by the resistor [3739].

Audio demodulator

The sound demodulation is done by the MSP3415 [7600], which is also fully controlled via I^2C-bus by the CC-P (determination of bandwidth, amplitude, standard, ...).The audio signals are available at pin 30 and pin 31 of [7600] and fed as “AFER”- & “AFEL”-line to the audio-I/O for further processing.

9.3.4 Audio routing



TR 01055_001
170502

The processing of audio is always done in stereo (e.g. separate left- and right-channel) and the complete switching is realized by using HEF4052, which is a dual four-to-one multiplexer. In principle there are three independent selectors:

a) Scart 1-Output-Path:
Pos [7504] is used to select either Scart 2-Input ("AIN2L"/"AIN2R") or the signal directly from the audio DAC [7004] ("ALDAC"/"ARDAC") as the output source for Scart 1 ("AOUT1L"/"AOUT1R").
The control is done by means of the lines "ASC1S" coming from [7408] (IC [7408] acts as a port expander for the CC-P) and "IASC1M", which is directly coming from the CC. Pos [7412] is used for level adaptation (3V3 to 5V) for the "IASC1M"-signal.

b) Scart 2-Output-Path:
Pos [7503] selects between Scart 1-Input ("AIN1L"/"AIN1R"), signals from the internal frontend ("AFEL"/"AFER") via MSP [7600] or audio directly from the DAC [7004] ("ALDAC"/"ARDAC"). The outputs of this switch are routed to Scart 2 ("AOUT2L"/AOUT2R"). This switch is controlled via "VSA1"- and "VSA2"-line. These lines come from [7408] that is acting as a port expander for the CC-P.

c) Record-Path:
Pos [7501] selects either signals from Scart 1 ("AIN1L"/"AIN1R") or Scart 2 ("AIN2L"/"AIN2R") or Cinch-Front ("AINFL"/"AINFR") or the MSP [7600] ("AFEL"/"AFER") and routes to the audio ADC [7007] ("ALADC"/"ARADC") for record purposes. The switch is controlled via "RSA1"- and "RSA2"-signals. These signals come from the MSP [7600], which acts as a port expander of the CC-P. As there can also exist a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP. The MSP acts as a preselector between audio from internal frontend or the DV-Input.
Each of these three selectors ([7501], [7503] & [7504]) has a separate Op-Amp on the output for level-adaptation-, performance- and line-driving-reasons. [7505-A & -B] for record, [7502-C & -D] for Scart 1-Output and [7502-A & -B] respectively for Scart 2. Every audio output line on the two Scart connectors can be "killed" (muted) by an extra transistors ([7506], [7508], [7509] &[7511]), which can be activated by the "AKILL"-line. This signal is generated by the circuit around [7404]/[7421] and is a combination of the "KILL"- from the CC-P and the "IPFAIL" of the power-supply-unit.

d) Line-Out-Path:
see chapter 9.3.5

e) Digital Audio Output-Path without IOE-Print:
Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the "DAOUT"-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3580] to cinch plug [1951]. The capacitor [2580] performs an AC-coupling between connector- and set-ground.

f) Digital Audio Output-Path with IOE-Print:
In case of usage of the IOE-print the digital audio signals (input and output) are directly routed from digital board via interface cable to plug [1920] on the IOE-print. The "DAOUT"-line is splitted into two signals, one for cinch out and one for optical out. The signal to cinch out first passes a 5-fold inverter [7250] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5250] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3259] to the cinch plug [1925] (or [1926-B] in case of option "DIGITAL IN"). The capacitors [2256] and [2266] perform an AC-coupling between connector- and set-ground. The second "DAOUT"-signal is fed directly via [3264] to the optical out transmitter [6255].

g) Digital Audio Input-Path with IOE-Print:
There are two possibilities for a digital audio input signal in case of option "DIGITAL IN". One is the signal from the optical receiver [6259], which is routed via [3269] directly to plug [1920]. The second is the signal from the cinch plug [1926-A]. This signal then passes an inverting amplifier [7250-6] and is then routed via [2253] to the plug [1920].

9.3.5 Audio ADC/DAC

a) PCBs with AD1852 [7004]:
The conversion of analog audio signals from the record-selector [7501] in the I/O ("ALADC"- & "ARADC") is done via UDA1361TS [7007]. This IC can process input signals up to 2Vrms by using external resistors [3047], [3053] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7007] to 3,3V via [7008] and the "PWONSW"-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data ("A_DAT"-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back into the analog domain is done by AD1852 [7004]. All necessary clock signals are coming from the dig. board and dig. audio data ("D_DATA0"-line) are converted into analog signals, which are available at pin 17/16 and pin 12/13 of [7004] as symmetrical signals. Afterwards an Op-Amp. [7003] (line driver & converting to unsymmetrical signal, gain = 1), which is also working as low-pass-filter to increase signal performance (noise, distortions,...), is passed. Then both signals ("ALDAC" & "ARDAC") are directly routed to the rear cinch output and also used in the audio-I/O for further processing. The DAC has also a mute possibility, which can be activated by setting pin 23 to 5V via [7001]. This mute is controlled either by the dig. board ("D_IKLL"-line) or the "IPFAIL"-signal from power-supply-unit (in this case it's the combination of "A_KILL" and "IPFAIL").
If the DAC is muted externally via pin 23 or if there are no audio data available (e.g. "D_DATA0"-line zero), the output pins 8 and 22 of the DAC change to high (+ 5V). These two signals are then combined with diode pos. 6006. After decoupling via [7009] the signal "DAC_MUTE" is used as mute signal for the mute transistors [7415], [7416] for cinch rear out.

b) PCBs with UDA1334BTS [7001]:
The conversion of analog audio signals from the record-selector [7501] in the I/O ("ALADC"- & "ARADC") is done via UDA1361TS [7005]. This IC can process input signals up to 2Vrms by using external resistors [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and the "PWONSW"-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data ("A_DAT"-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back into the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data ("D_DATA0"-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation, gain = 2) which is also working as low-pass-filter to increase signal performance (noise, distortions,...), is passed. Then both signals ("ALDAC" & "ARDAC") are directly routed to the rear cinch output and also used in the audio-I/O for further processing. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board

("D_IKLL"-line) or the "IPFAIL"-signal from power-supply-unit (in this case it's the combination of "A_KILL" and "IPFAIL").
In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of "digital silence" by the circuit around [7008], [7009] and [7010], when no audio data are available (e.g. "D_DATA0"-line zero).
This function can be also activated via the "ION"-line (set to high during any stand-by mode). To avoid signal distortions (clipping) the mute transistors for cinch rear out [7415], [7416] are decoupled via [7011].

9.3.6 Video-routing

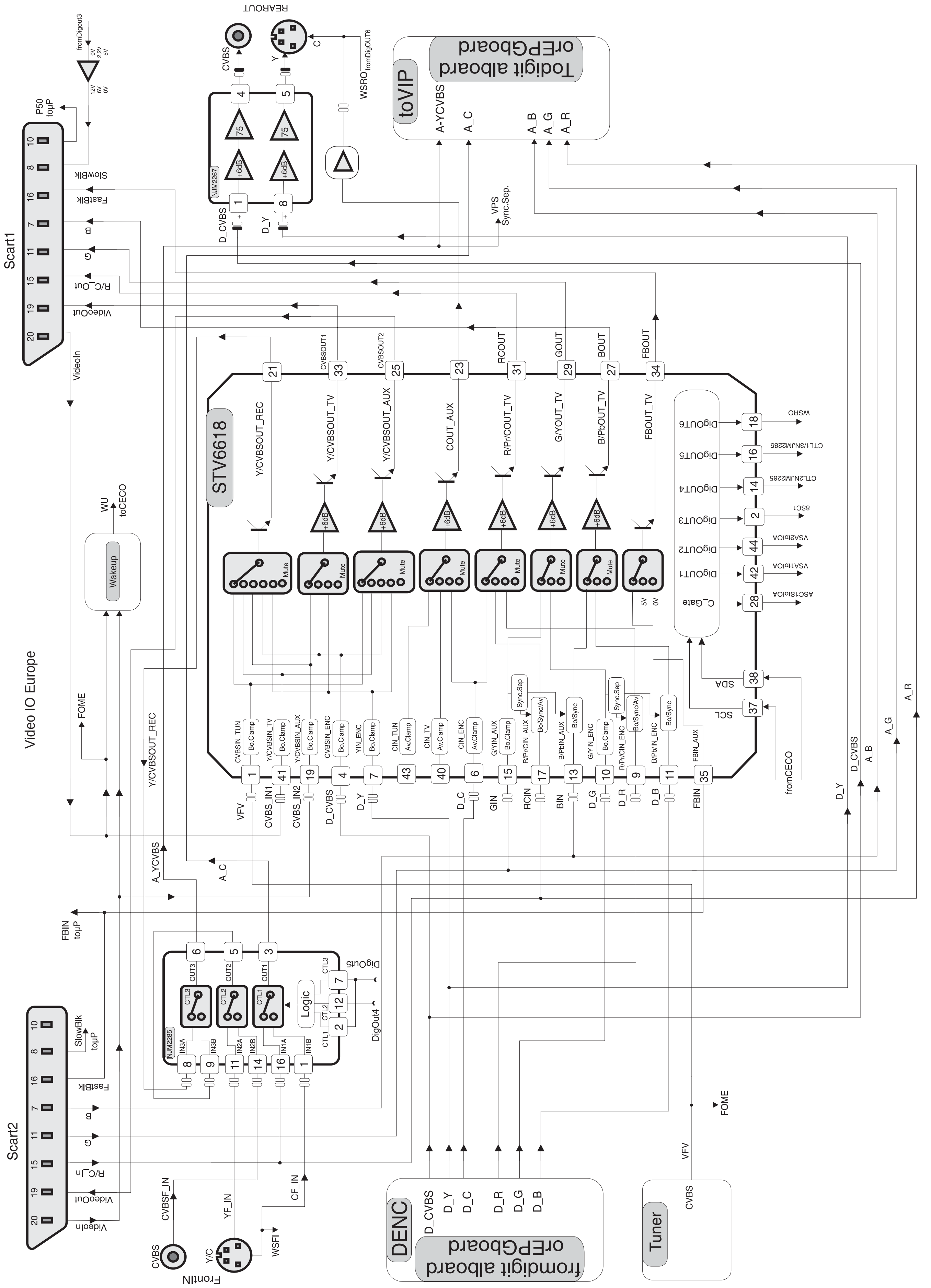


Figure 9-1

The Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I^2C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6 dB-amplification and a 75 Ohms driver-stage inside. This IC includes also several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend ("VFV"), the input from Scart 1 ("YCVBSIN1") or the signal from Scart 2 ("YCVBSIN2"). Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the preselected ones are done. The output signals of [7411] are fed as "A_YCVBS"- and "A_C"-line to the digital board for further processing.

To reduce the number of external presets there exists only one preset for CVBS- and Y/C-front. The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on µP-sub-board) where Y/C has higher priority.

The R/G/B-inputs and the Fast-Blanking-line from Scart 2 are routed over the optional EPG board to the digital PCB. Also all other video signal from the analog board are routed through the EPG board if present. These signals are also available on the corresponding input-pins of the STV6618 to enable a loop-through in AV-Standby. In this mode the set has to behave like a cable between the two Scart-connectors. AV-Standby is activated either by a "high" level on pin 8 of Scart 2 ("active device is present") or by the "WU"-line (wake up). This signal is generated out of the circuit around [7401], [7402] & [7403] and will become "high" if there is a signal on pin 20 of Scart 1- or Scart 2. The detection of the input level on pin 8 of Scart 2 ("8SC2") is done via an analog input of the CC-P (less than 2V means inactive; 4,5V to 7V determines a source with 16:9 picture-ratio and greater than 9,5V is an active 4:3 source).

All signals from the digital board ("D_R", "D_G", "D_B", D_C", "D_Y" and "D_CVBS" are routed to the proper inputs of the STV6618 for amplification and driving purpose before they can be seen on the appropriate Scart outputs. In case of EPG the signals from the digital board are routed through the EPG board where the selection between digital board video or EPG OSD is taken.

The "D_CVBS"- and the "D_Y"-line are passing a 6 dB-amplifier and driver-IC [7410] and are then routed to the CVBS-Cinch and Y/C-out rear. The chroma signal for this Y/C out is coming from the STV6618 - which makes the 6 dB-amplification - and a driver [7406] in between.

The detection of the picture ratio information on the Y/C-input front is made by measuring the DC-level on the Chroma signal via analog input of the CC-P ("WSFI"-line). In case the level is higher than 3,5V the input signal is a 16:9 source. If the level is lower than 2,4V the picture ratio is 4:3.

For generation of the appropriate DC-voltage on the Y/C-out rear the "WSRO"-line is controlled via pin 18 of [7408] by the CC-P (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).

The control of the switching voltage (Pin 8 of Scart 1) is done via 3-level-pin (nr.2) of the STV6618 [7408] and the transistors [7405], [7407] & [7409]. A "low" on pin 2 of [7408] causes around 11V on pin 8-Scart 1 (e.g. source with 4:3 picture-ratio active). Medium level (2,5V) on pin 2 of the STV6618 generates medium level (approx. 6V) on pin 8-Scart 1 (e.g. active source with 16:9) and a "high" on pin 2 of the STV6618 pushes pin 8-Scart 1 to "low" (e.g. inactive).

9.3.7 VPS/PDC- and Text-Dataslicer

For extraction of relevant information out of the video signal (time controlled recording, net-name-identification, time- & date- download) the STV5348 [7931] is used. Data transfer to/from the CC is fully done via I^2C-bus and the input signal for decoding is the same as the one being routed to the digital board for recording purposes ("A_YCVBS"-line).

9.3.8 Analog Follow-Me

This circuit compares the video signal from the internal frontend ("VFV") of the recorder with that one of the connected TV-set ("CVBS1"). The TV set delivers the signal via Scart-cable. A comparator [7934] and several additional parts ([7932], [7933], ...) are used to compare the two video signals. In case of both input signals are equal the output-line of this circuit ("FOME") is set to low. Detection is made via an input port of the CC-P.

9.4 Analog board NAFTA- & APAC-Pal- version

9.4.1 Frontend NAFTA

[1701] demodulates the video signal from the antenna input. Tuner and IF-demodulator are in one unit. Also a modulator is included in that part. The audio- and video-signal to the modulator are the ones from the selected input or the playback path of the set ("AMCO"- and "D_CVBS"-line). The control of the tuner is fully done via I^2C-bus by the CC-P. Via the "MSW"-signal and [7701] the modulator is switched on and off. In opposite to this the antenna loop-through is opened or closed. In the APAC-Pal version POS [1700] is used with the difference that it demodulates only PAL- instead of NTSC-signals and has also no modulator. The "CSW_SSW" line switches the modulator between CH3 or CH4 in the NTSC-version.

To achieve optimal tuning the "AFC"-signal is detected by the CC via an analog input; [3701], [3702] and [3703] are used for level adaptation (5V to 3V3). Pos [7700] is a driver for the video signal.

The sound demodulation is realized by the MSP34x5 [7600], which is also fully controlled via I^2C-bus by the CC-P (determination of bandwidth, amplitude, standard, ...). The audio signals are available at pin 30 and pin 31 of [7600] and fed as "AFER"- & "AFEL"-line to the audio-I/O for further processing. As this PCB is used for different regions (NAFTA and APAC) either MSP3425 or MSP3415 are assembled.

9.4.2 Audio routing

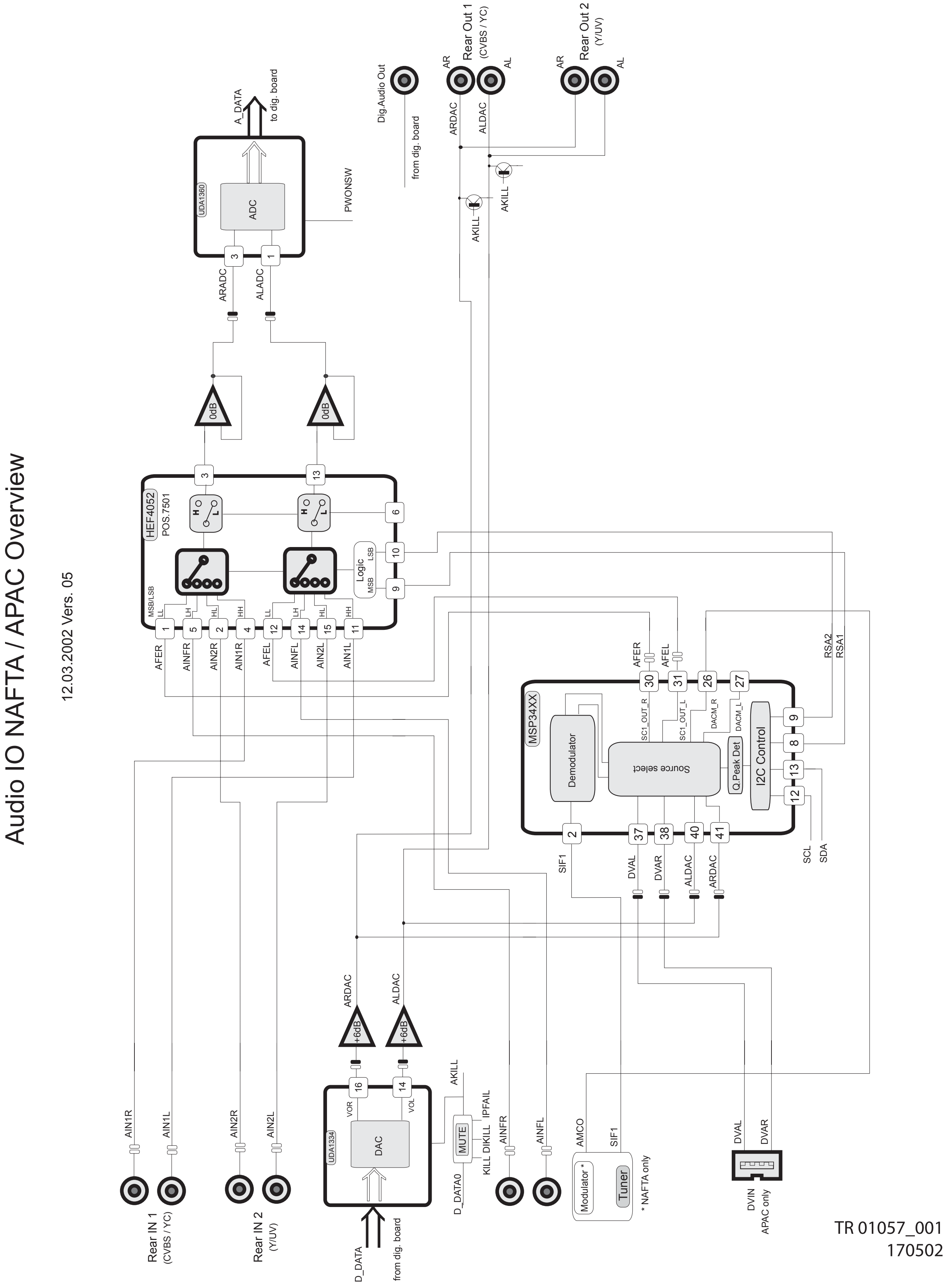


Figure 9-2

The sound processing is always done in stereo (that means separate left- and right-channel).

a) Record-Path:
The complete selection of the audio signal for recording is done by a HEF4052 [7501], which is a dual four-to-one multiplexer. The input lines for the selector [7501] are coming either from MSP [7600] (“AFEL”/”AFER”) or cinch rear in 1 (“AIN1L”/”AIN1R”) or cinch rear in 2 (“AIN2L”/”AIN2R”) or the cinch in front (“AINFL”/AINFR”). The [7501] is controlled via “RSA1”- and “RSA2”-signals coming from the MSP [7600]. The MSP acts as a port expander of the CC-P. The Op-Amp on the output [7504] is necessary for performance reasons and acts also as a driver. The selected signals “ARADC” and “ALADC” are directly fed to the Audio-ADC.
As there can exist also a fifth input in case of DV-In is present the corresponding analog audio signals from the DVIO-board are firstly routed via extra cable and connector [1960] to the MSP, which acts as a preselector between audio from internal frontend or the DV-Input.

b) Line-Out-Path:
see chapter 9.4.3

c) Digital Audio Output-Path without IOE-Print:
Additionally to analog audio the set is also equipped with a digital output via cinch plug [1951]. The signal is generated on the dig. board and routed via audio interface cable and connector [1900] to the Ana-PCB. Here the “DAOUT”-line first passes a 6-fold inverter [7580] being used as a driver and for performance reasons (noise reduction, jitter, etc.). Afterwards a transformer [5580] is necessary to achieve the correct level and also to have a floating output with isolated ground before the signal is fed via [3580] to cinch plug [1951]. The capacitors [2580], [2582] and [2583] perform an AC-coupling between connector- and set-ground.

d) Digital Audio Output-Path with IOE-Print:
see chapter 9.3.4.f

e) Digital Audio Input-Path with IOE-Print:
see chapter 9.3.4.g

9.4.3 Audio ADC/DAC

The conversion of analog audio signals from the record-selector [7501] in the I/O (“ALADC”- & “ARADC”) is done via UDA1361TS [7005]. This IC can process input signals up to 2Vrms by using an external resistor [3039], [3041] in series to the input pins. As the level from the DVIO-Board is only 1Vrms a 6dB step can be performed by setting pin 7 of [7005] to 3,3V via [7006] and “PWONSW”-line controlled by the CC-P to use the whole dynamic range of the ADC. All required clock signals are generated on the dig. board and only the audio data (“A_DAT”-line) are routed from Ana- to Dig.-PCB for further processing.
The transformation of dig. audio back to the analog domain is done by UDA1334BTS [7001]. All necessary clock signals are coming from the dig. board and dig. audio data (“D_DATA0”-line) are converted into analog signals, which are available at pin 14 and pin 16 of [7001]. Afterwards an Op-Amp. [7002] (line driver & level adaptation) which also works as a low-pass-filter to increase signal performance (noise, distortions,...) is passed. Then both signals (“ALDAC” & “ARDAC”) are directly routed to the rear cinch output. The DAC has also a mute possibility, which can be activated by setting pin 8 to 3,3V via [7003]. This mute is controlled either by the dig. board (“D_IKLL”-line) or the “IPFAIL”-signal from power-supply-unit. In addition to that the DAC [7001] and the cinch outputs can be killed (muted) in case of “digital silence” by the circuit around [7008], [7009] and [7010], when no audio data are available (e.g. “D_DATA0”-line zero).
The signals from the audio DAC part (“ARDAC”/”ALDAC”) are directly routed to both cinch rear outputs, which are connected in parallel. To avoid plops and any other audible noise on the output there is a mute-stage implemented [7509], [7511] for each channel. The activation is done via “AKILL”-line, which is a combination of the “KILL” from CC-P, “DAC_MUTE” from DAC-part and “IPFAIL” from the power-supply-unit. The circuit around [6430], [6431], [7430] and [7404] generates this signal.

9.4.4 Video-routing

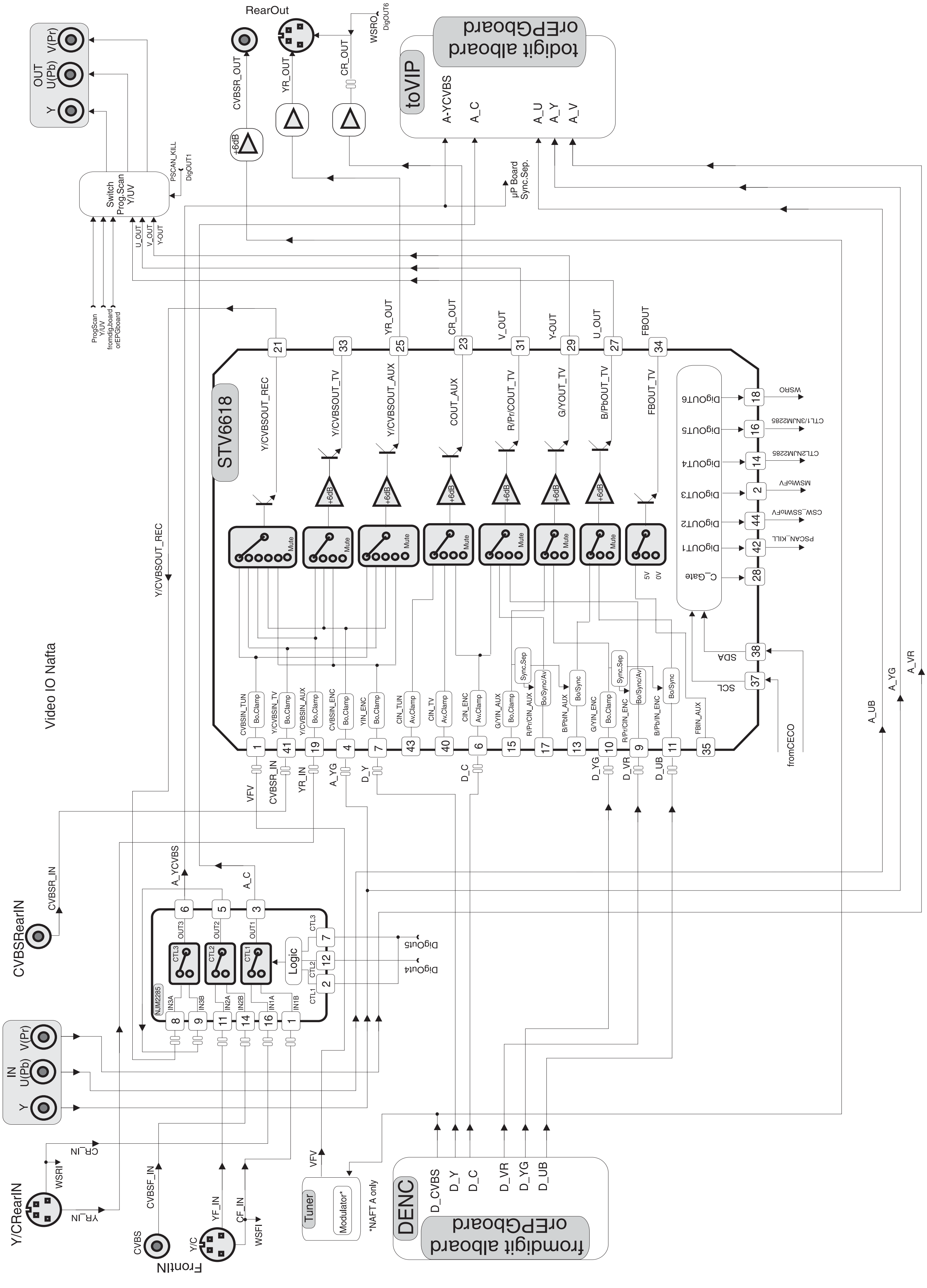


Figure 9-3

The Video-I/O-switching is basically realized by the matrix switch STV6618 [7408], which is controlled via I^{2}C-bus by the CC. All used outputs excluding pin 21 (Y/CVBS-REC) have a 6dB-amplification and a 75 Ohms-driver-stage inside. This IC also includes several digital outputs, which are used for switching purposes on the analog board. The record selector inside the switch selects between the CVBS from frontend, the CVBS from Cinch-Rear or Y from the S-Video-input rear. Afterwards the signal passes another switch [7411] in which a selection between signals from the front or the preselected ones is done. The output signals of [7411] are fed as “A_YCVBS”- and “A_C”-line to the digital board for further processing.

To reduce the number of external presets there is only one station for CVBS or Y/C (front and rear). The set automatically detects between the two inputs depending on the presence of a video signal (sync separator-circuit on µP-sub-board) where Y/C has higher priority.

The Y/U/V-inputs are routed over the optional EPG board to the digital PCB. Only the Y-line has to be present additionally on pin 4 of [7408] for video recognition. Also all other video signal from the analog board are routed through the EPG board if present.

The signals “D_C” and “D_Y” are fed through [7408] (6dB amplification) and via [7406], [7409] used as driver to the S-Video output connector. The “D_CVBS” line is directly routed to the modulator and via the circuit around [7431] and [7432] amplified by 6dB before it is fed to the CVBS output plug. In case of EPG the signals from the digital board are routet through the EPG board where the selection between digital board video or EPG OSD is taken.

The Y/U/V signals from the digital board are also passing [7408] for 6dB amplification and driving purpose.

To achieve optimal picture quality the set is equipped with a simple progressive scan function based on a so-called line doubler. The complete generation of the signal is done on the digital board and via a separate cable and connector [1946] the corresponding Y/U/V lines are routed to the analog PCB. Also the YUVprogressive signals are switchable to EPG OSD on the EPG board if implemented. As there is only one Y/U/V output available a switching between interlaced and progressive output is necessary. While the transistors [7421], [7422], [7424], [7425], [7427] and [7428] are used as driver for Y/U/V progressive, [7423], [7426] and [7429] together with [7405] are necessary for killing these signals via pin 42 of [7408] in case the interlaced is selected (“PSCAN_KILL”-line set to low). If progressive output is active the pins 27, 29 and 31 of [7408] are set to high impedance and “PSCAN_KILL” is also high (e.g. 5V).

The detection of the picture ratio information on the Y/C inputs (rear or front) is done by measuring the DC-level on the Chroma signal via an analog input of the CC-P (“WSRI”- and “WSFI”-line). In case the level is higher than 3,5V the input signal is a 16:9 source, if the level is lower than 2,4V the picture ratio is 4:3.

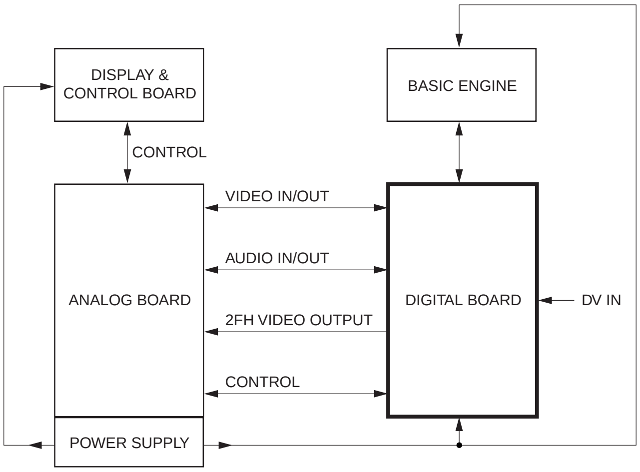
For generation of the appropriate DC-voltage on the Y/C output the “WSRO”-line is controlled via pin18 of [7408] by the CC-P (Pin 18 set to low means 4:3, pin 18 set to high determines 16:9).

During Stand-By there is also no loop-through of any input to any output performed.

9.5 Digital Board Chrysalis 2.1

9.5.1 Introduction

Block diagram 2nd generation DVD recorder



CL 36532004_001.eps
140203

Figure 9-4

This 2nd generation Digital Board is based on the highly integrated 'Chrysalis' IC. Its predecessors, the 'Empire' and 'Empress' based boards, had two PWBs mounted on top of each other (due to separate DVIO board). For this new generation, all functionality is now available on one PWB in one BGA IC (Ball Grid Array) i.s.o. four VLSI ICs.

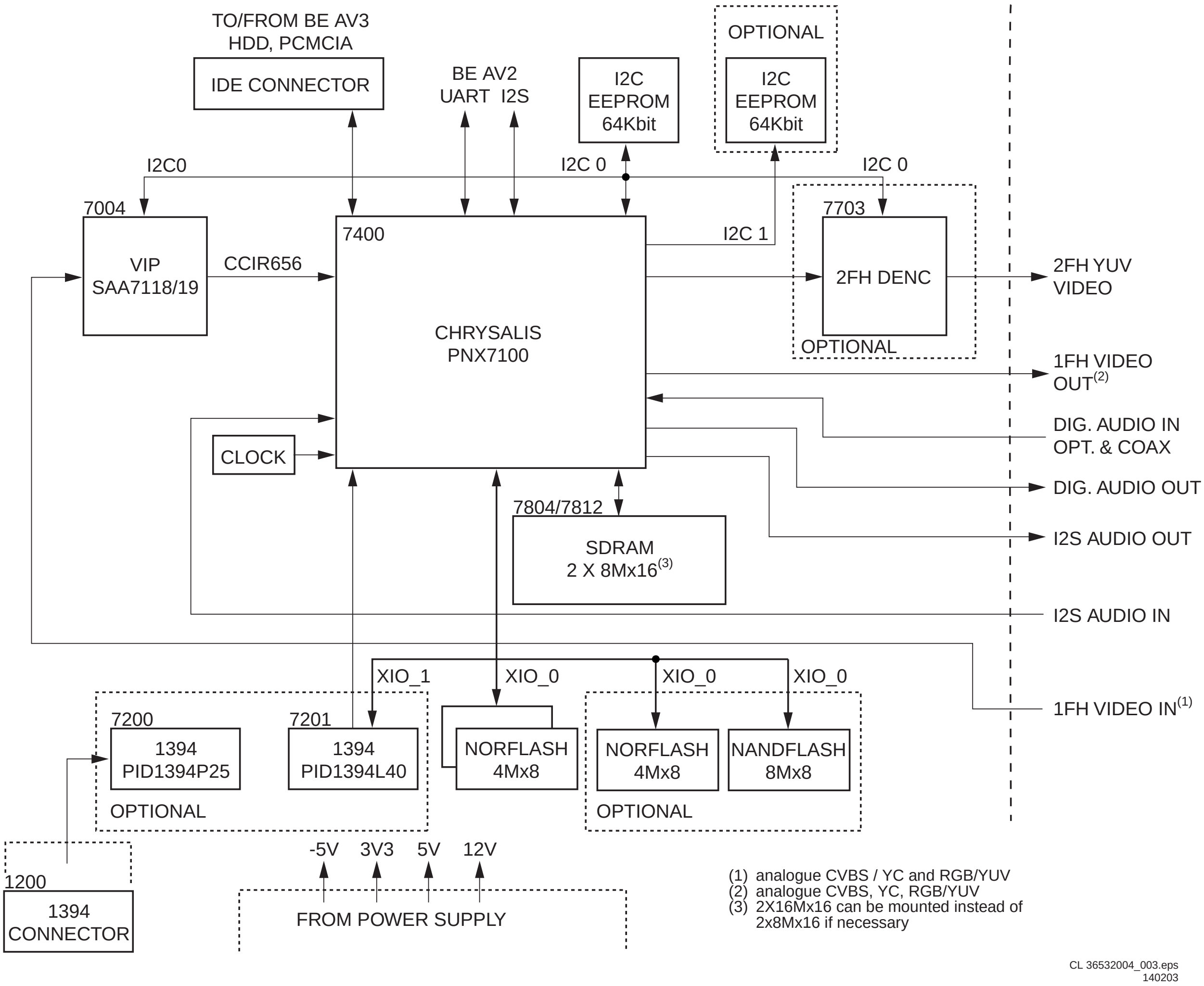
The board encodes and multiplexes analogue video and digital uncompressed audio (I2S) into an MPEG2 stream. This MPEG2 stream is formatted, to be recorded by the DVD+RW engine. In playback, the board will decode the MPEG2 stream into analogue and digital audio and into analogue video. In addition, a DV stream can be received via IEEE1394 (i-Link), and transformed to MPEG2 format.

There are versions foreseen, to generate a progressive scan analogue video output. In the standard Chrysalis board, the progressive video output is generated by the PNX7100. In the Chrysalis 'F' it is generated by the Faroudja FLi2301.

The Chrysalis Digital board is pin compatible with the Empress digital board in terms of A/V IO, BE interface, Power Supply, and Service interface. For functional enhancements, several connectors are added:IDE connector (HDD, AV3, PCMCIA, etc.).

9.5.2 Record Mode

Block diagram Chrysalis Digital Board



(1) analogue CVBS / YC and RGB/YUV
(2) analogue CVBS, YC, RGB/YUV
(3) 2X16Mx16 can be mounted instead of 2x8Mx16 if necessary

Figure 9-5

Video Part

The analogue video input signals CVBS, YC, and YUV/RGB (RGB for EURO and YUV for USA), are routed via the analogue board to connector 1904 and sent to IC7004 (SAA7118, Video Input Processor).

The digital video input signals are routed from the DV-In connector (item 1200) via ICs 7200 (1394 PHY) and 7201 (1394 LINK) to IC7400 (PNX7100, Chrysalis).

The multistandard Video Input Processor (VIP, IC7400) encodes the analogue video to digital video stream (CCIR656 format). It provides filtering of the analogue signals and separation of luminance and chrominance by a comb filter. The output stream, named ITU_IN(7:0), is then routed to the Chrysalis IC (PNX7100). This IC encodes and decodes the digital video stream into/from MPEG2 format.

Audio Part

I2S audio is sent from the analog board to the Chrysalis IC via connector 1900. The Chrysalis compresses the I2S audio data into an MPEG1-L2/AC3 audio stream.

Front-end I2S

IC7400 (Chrysalis) interfaces directly to the Basic Engine (BE) via connectors 1100 (clock and data) and 1105 (control). For future use (with AV3 BE module, HDD, or card reader) it also interfaces to an IDE bus via connector 1102 .

It buffers the data streams that are coming from (or going to) these hardware modules.

In the Chrysalis, the video MPEG2 stream and the audio AC3 stream are multiplexed into an I2S stream. The serial data are sent to the Basic Engine for recording.

9.5.3 Playback Mode

During playback, the serial data from the Basic Engine is going directly to the PNX7100 via the serial front-end I2S interface. The PNX7100 is an MPEG CoDec and has the following outputs:

- To the analogue board: analogue video RGB, YC, CVBS on connector 1904.
- I2S audio (PCM format) on connector 1900.
- SPDIF audio (digital audio output) on connector 1904.
- Progressive video on connector 1704.
- Communication gateway (RS232) on connector 1104.

9.5.4 Basic Engine Interfaces

AV2 Basic Engine (VAE8015 and VAE8020)

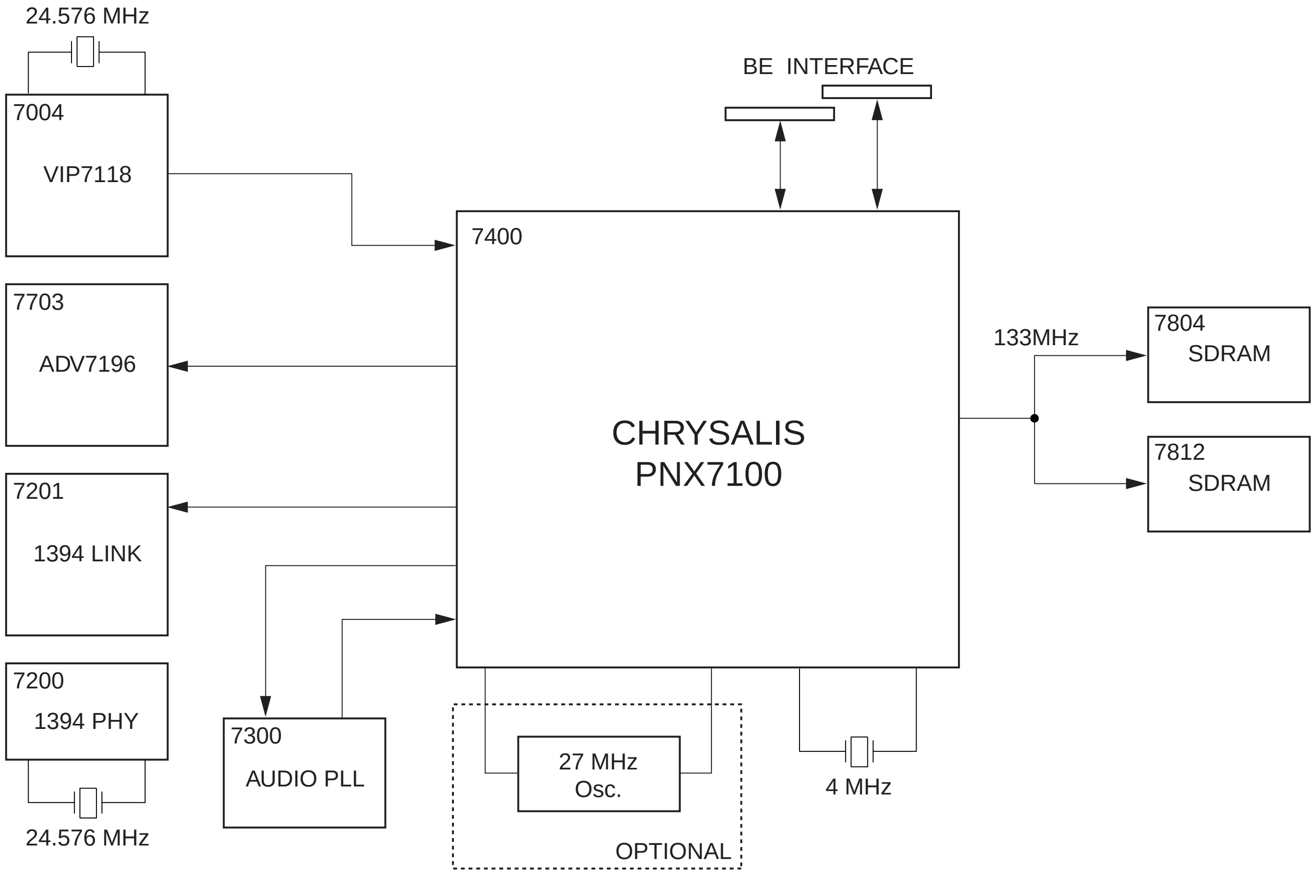
The UART interface (for the S2B commands) between the Chrysalis and the servo processor (MACE3 on the BE module), controls the AV2 Basic Engine during record and playback mode. For data transport, an I2S bus is used.

For detailed information on the AV2 BE module, see Service Manual 3122 785 12470.

AV3 Basic Engine (VAE8030)
To be prepared for new developments, the Chrysalis Digital Board is equipped with two IDE busses (ATAPI). They can be used for connecting to the new generation Basic Engine (e.g. the AV3), a Hard Disc Drive (HDD), or a Smart Card Reader.

9.5.5 Clock Distribution

Clock distribution on Chrysalis board



CL 36532004_004.eps
140203

Figure 9-6

The PNX7100 has a complex clock system, which is needed to support the processes running at different frequencies such as video decoding, audio decoding or peripheral I/O devices etc. To ensure a synchronous initialisation of all the registers and state machines, all the PLLs are switched to their default frequency and the reset sequence is run at 4 MHz. Then when the booting control unit is correctly initialized and once it has captured all the booting parameters, it sets the PLLs to its functional frequency to allow the modules to run at their nominal frequencies. Thanks to a clock blocking mechanism, the frequency switching is glitch free.

System clocks:
- PNX7100 (IC7400, pins AF9 and AF10) : 4 MHz provided by the xtal oscillator 7402.
- SAA7118 (IC7004, pins A3 and B4): 24.576 MHz provided by xtal 1001.
- ADV7196 (IC7703, pin 25): 27 MHz provided by PNX7100.
- SDRAM (IC7804 and 7808, pin 38): 133 MHz provided by the PNX7100.
- 1394-LINK (IC7201, pin 88): 49.152 MHz provided by 1394-PHY.
- 1394-PHY (IC7200, pins 59 and 60): 24.576 MHz provided by xtal 1201.

9.5.6 Power Supply

The Digital Board is not powered in standby mode. The control signal 'ION' (Inverse On), coming from the analogue board, will enable the PSU, and power the digital board.
- ION = High: the digital board is in powered down standby mode.
- ION = Low: the power supply to the digital board is enabled.

The 3V3, +5V, -5V, and +12V come from the PSU, while the 1V8 core voltage is generated on the board by a low voltage buck controller (item 7501). It provides the control for a DC-DC power solution producing an 1.8V output voltage over a wide current range. The NCP1570-based solution is powered from 12 V with the output derived from the 3V3 supply. It contains all required circuitry for a synchronous NFET (IC7500-1 and -2) buck regulator.

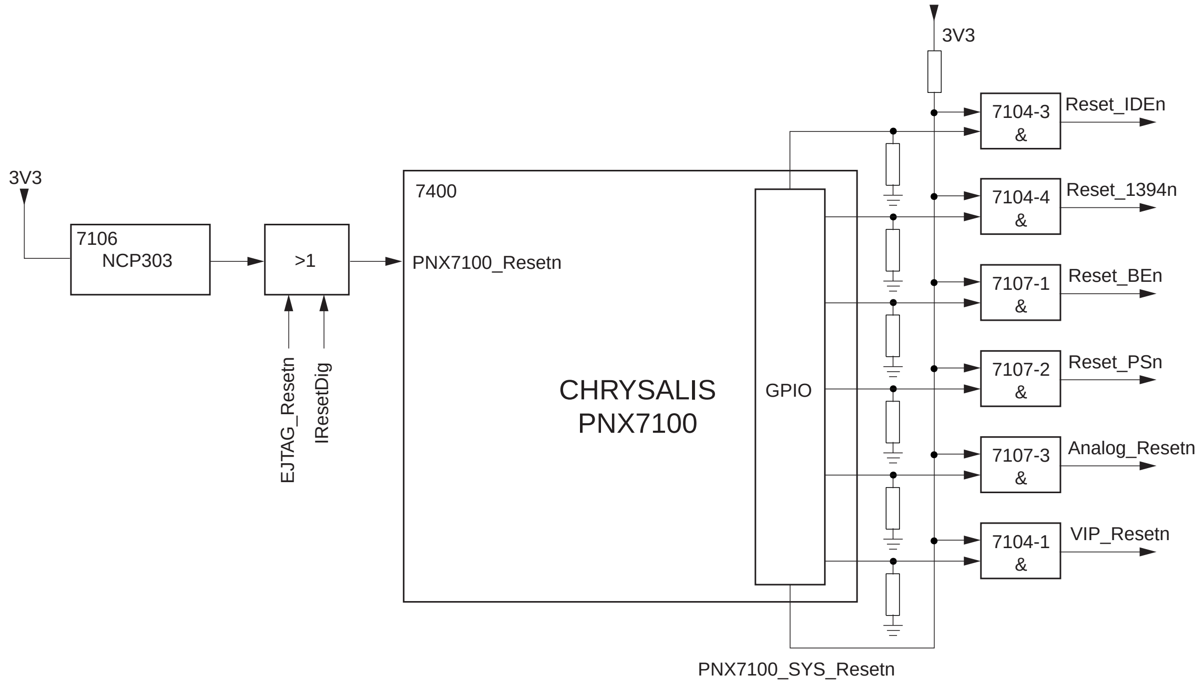
9.5.7 Memory

Several memories are used on the Chrysalis Digital Board:
- EEPROM IC7810: this memory contains all the necessary boot parameters of the board.
- EEPROM IC7809: this memory contains all the necessary parameters for the application.

- FLASH IC7807(05/11): this memory contains the application-, diagnosis-, and service software.

9.5.8 Reset

Reset concept Chrysalis board



CL 36532004_005.eps
140203

Figure 9-7

The voltage detector NCP303LSN29 (IC7600) provides the reset signal PNX7100_RESETn (active 'low') with the correct timing behavior. This circuitry functions as a Power-On Reset (POR) module, which detects the minimum functional voltage that is needed by the device. It also detects any voltage drop. When the power voltage is outside the nominal range, a reset signal is generated by the POR module and fed to the reset module which controls the individual reset of the different peripherals and processing units.
There are two control lines which can overrule this reset signal:
- IRESET_DIG (controlled by the microprocessor on the Analogue Board).
- EJTAG_RESETn (only for production).

They can pull the output of the NCP303LSN29 (item 7106) down via a shottky diode.
So when the output signal PNX7100_RESETn is 'low', the board will reset. When this signal is 'high', the board is up and running.

The PNX7100_SYS_RESETn is a general enabling signal for the different reset lines. All other reset lines are directly driven from Chrysalis port pins (e.g. MPIO13_IDE1_RESETn). All reset lines are logically connected via 74LVC08D (item 7104) and (item 7107) AND-gates. If both reset signals are low, all other external devices are initialised.

9.5.9 I2C Bus

The PNX7100 is the master of the I2C bus (during reset, external I2C masters are allowed). The following ICs are controlled by the I2C bus:
- IC7809.
- IC7810 NVRAMs.
- IC7004 VIP.
- IC7700 FLI2301 Video De-interlacer Line Doubler (for Chrysalis-F boards).
- IC7703 ADV7196 Video Enc (for progressive scan done by Chrysalis).

9.5.10 I/O Connectors

AIO Connector (item 1900)
The Audio In/Out (AIO) connector is used to interchange digital audio signals between Analog- and Digital Board.

DAIO Connector (item 1901)
The Digital Audio In/Out (DAIO) connector is used to interchange digital audio (SPDIF) signals between the IOE-Board and the Digital Board.

VIO Connector (item 1904)
The Video In/Out (VIO) connector is used to interchange analogue video signals between Analog- and Digital-Board.

9.5.11 Progressive Scan

Introduction
There are two versions foreseen, to generate a progressive scan analogue video output:
- In the standard Chrysalis board, the 'low end' progressive video output is generated by the PNX7100.
- In the Chrysalis 'F', the 'high end' progressive output is generated by the Faroudja FLI2301. This IC offers additionaly DCDi, upscaling to HDTV, and picture enhancement.

Description
The progressive scan part is integrated in the Digital Board and built around the FLI2301 de-interlace/line doubler (7701). This

I2C controlled de-interlace uses a 64Mbit SDRAM (32bit x 2M) to perform high quality de-interlacing (meshing). The de-interlace gets its digital YUV input data from the PNX7100 (7400). The format of the digital YUV input to the Fli2301 is CCIR656 with separated Hsync, Vsync, and odd/even signal running on 27MHz.

9.6 Service UART Interface

Logic IC 74HCT14D (item 7111) is used to make a level conversion from microprocessor (LVTTL) to +/-5V (compatible with most RS232 interfaces) and vice versa. The control line MPIO19_CTL_SERVICE is used to activate service and diagnostic SW at start up procedure. The connectivity is provided via an external service tool.

9.7 I/O Extension Board

This board feeds the internal S/PDIF signal from the Digital board to an optical and/or digital out connector. For European players, also an YUV output is present on this board.

9.8 IC Descriptions

9.8.1 Display Board

IC 7103 TMP87CH74F Display Board, Front Microprocessor

Block Diagram

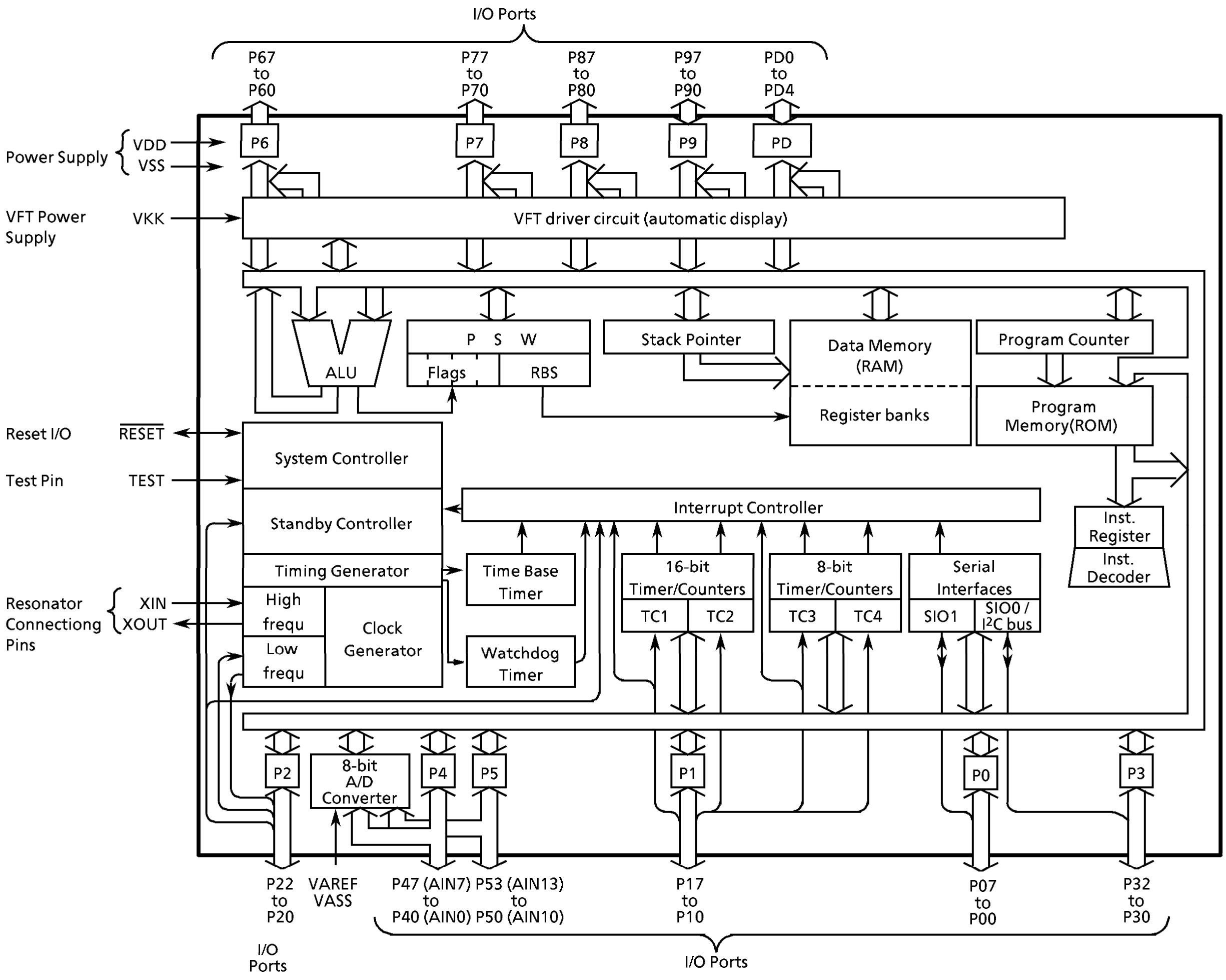


Figure 9-8

Pin Function

Pin Name	Input / Output	Function	
P07 to P03	I/O	Two 8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a SIO input/output, an External interrupt input, a timer/counter input, the latch must be set to "0". When used as a PPG output or divider output, the latch must be set to "1".	
P02 (SO1)	I/O (Output)		SIO1 serial data Output
P01 (SI1)	I/O (Input)		SIO1 serial data Input
P00 ($\overline{\text{SCK1}}$)	I/O (I/O)		SIO1 serial clock input/output
P17 (INT4/TC3)	I/O (Input)		External interrupt input 4 or Timer/Counter 3 input
P16 (INT2)			External interrupt input 2
P15 (INT3/TC1)			External interrupt input 3 or Timer/Counter 1 input
P14 (TC4/$\overline{\text{PDO}}$/$\overline{\text{PWM}}$)	I/O (I/O)		Timer counter 4 input or 8-bit programmable divider output or 8-bit PWM output
P13 ($\overline{\text{DVO}}$)	I/O (Output)		Divider output
P12 (TC2/$\overline{\text{PPG}}$)	I/O (I/O)		Timer counter 2 input or Programmable pulse generator output
P11 (INT1)	I/O (Input)		External interrupt input 1
P10 ($\overline{\text{INT0}}$)			External interrupt input 0
P22 (XTOUT)	I/O (Output)	3-bit input/output port with latch. When used as input port, or external interrupt input, STOP mode release signal input, the latch must be set to "1".	Resonator connecting pins (32.768 kHz). For inputting external clock, XTIN is used and XTOUT is opened.
P21 (XTIN)	I/O (Input)		
P20 ($\overline{\text{INT5}}$/$\overline{\text{STOP}}$)			External interrupt input 5 or STOP mode release signal input
P32 ($\overline{\text{SCK0}}$)	I/O (I/O)	3-bit programmable input/output ports (Sink open drain). Each bit of these ports can be individually configured as an input or an output under software control. When used as a I^{2}C input/output, the latch must be set to "1".	SIO0 serial clock input/output
P31 (SDA/SO0)	I/O (I/O/Output)		I^{2}Cbus serial data input/output or SIO0 serial data output
P30 (SCL/SI0)	I/O (I/O/Input)		I^{2}Cbus serial clock input/output or SIO0 serial data Input
P47 (AIN7) to P40 (AIN0)	I/O (Input)	8-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P4CR must be set to "0".	A/D converter analog inputs
P53 (AIN13) to P50 (AIN10)	I/O (Input)	4-bit programmable input/output ports (tri-state). Each bit of these ports can be individually configured as an input or an output under software control. When used as a analog input, the P5CR must be set to "0".	A/D converter analog inputs
P67 (V7) to P60 (V0)	I/O (Output)	Four 8-bit high brackdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	VFT driver outputs
P77 (V15) to P70 (V8)			
P87 (V23) to P80 (V16)			
P97 (V31) to P90 (V24)			
PD4 (V36) toPD0 (V32)	I/O (Output)	5-bit high breakdown voltage output ports with the latch. When used as a VFT driver output, the latch must be cleared to "0".	

Figure 9-9

Pin Name	Input / Output	Function
XIN, XOUT	Input, Output	Resonator connecting pins for high-frequency clock. For inputting external clock, XIN is used and XOUT is opened.
$\overline{\text{RESET}}$	I/O	Reset signal input or watchdog timer output/address-trap-reset output/system-clock-reset outputted.
TEST	Input	Test pin for out-going test. Be tied to low.
VDD, VSS	Power Supply	+ 5 V, 0 V (GND)
VKK		VFT driver power supply
VAREF, VASS		Analog reference voltage inputs (High, Low)

Figure 9-10

9.8.2 IC's Analog Board

IC7408: STV6618 Analog Board, Video Switch Matrix

1.2 Pin Description

Pin No.	Symbol	Description
1	Y/CVBSIN_TUN	Y/CVBS Input from Tuner
2	DIGOUT3	Digital Output Pin 3
3	GND1	Ground Supply 1 for Video Inputs
4	CVBSIN_ENC	CVBS Input from Encoder
5	DECV	Video decoupling capacitor
6	CIN_ENC	Chroma Input from Encoder
7	YIN_ENC	Y Input from Encoder
8	V_{CC}	+5 V Power Supply for Video Inputs
9	R/PR/CIN_ENC	Red or Pr or Chroma Input from Encoder
10	G/YIN_ENC	Green or Y Input from Encoder
11	B/PBIN_ENC	Blue or Pb Input from Encoder
12	GND2	Ground Supply 2 for Video Inputs
13	B/PBIN_AUX	Blue or Pb Input from Auxiliary (SCART2 or external Cinch)
14	DIGOUT4	Digital Output Pin 4
15	G/YIN_AUX	Green or Y Input from Auxiliary (SCART2 or external Cinch)
16	DIGOUT5	Digital Output Pin 5
17	R/PR/CIN_AUX	Red or Pr or Chroma input from Auxiliary (SCART2 or external Cinch)
18	DIGOUT6	Digital Output Pin 6
19	Y/CVBSIN_AUX	Y/CVBS Input from Auxiliary (SCART2 or external Cinch)
20	VCCB_REC	Video Output Recorder Buffer Supply Pin
21	Y/CVBSOUT_REC	Y/CVBS Output to Recorder
22	GNDB_REC	Ground Supply for Recorder Buffer
23	COUT_AUX	Chroma Output to Auxiliary (SCART2 or external Cinch)
24	VCCB1	Video Output Buffer Supply Pin
25	Y/CVBSOUT_AUX	Y/CVBS Output to Auxiliary (SCART2 or external Cinch)
26	GNDB	Ground Supply for Video Buffer
27	B/PBOUT_TV	Blue or Pb Output to TV (SCART1 or external Cinch)
28	C_GATE	External Transistor Command for Bidirectinnal B/C SCART I/O
29	G/YOUT_TV	Green or Y Output to TV (SCART1 or external Cinch)
30	VCCB2	Video Buffer
31	R/PR/COUT_TV	Red or Pr or Chroma Output to TV (SCART1 or external Cinch)
32	VCCB3	Video Output Buffer Supply Pin
33	Y/CVBSOUT_TV	Y/CVBS Output to TV (SCART1 or external Cinch)
34	FBOUT_TV	Fast Blanking Output to TV (SCART1)
35	FBIN_AUX	Fast Blanking Input from Auxiliary (SCART2)

Pin No.	Symbol	Description
36	VDD	+5 V Digital Power Supply
37	SCL	I²C Bus Clock
38	SDA	I²C Bus Data
39	GNDD	Digital Ground Supply
40	CIN_TV	Chroma Input from TV (SCART1 or external Cinch)
41	Y/CVBSIN_TV	Y/CVBS Input from TV (SCART1 or external Cinch)
42	DIGOUT1	Digital Output Pin 1
43	CIN_TUN	Chroma Input from Tuner
44	DIGOUT2	Digital Output Pin 2

Figure 2: STV6618 Input/Output Diagram

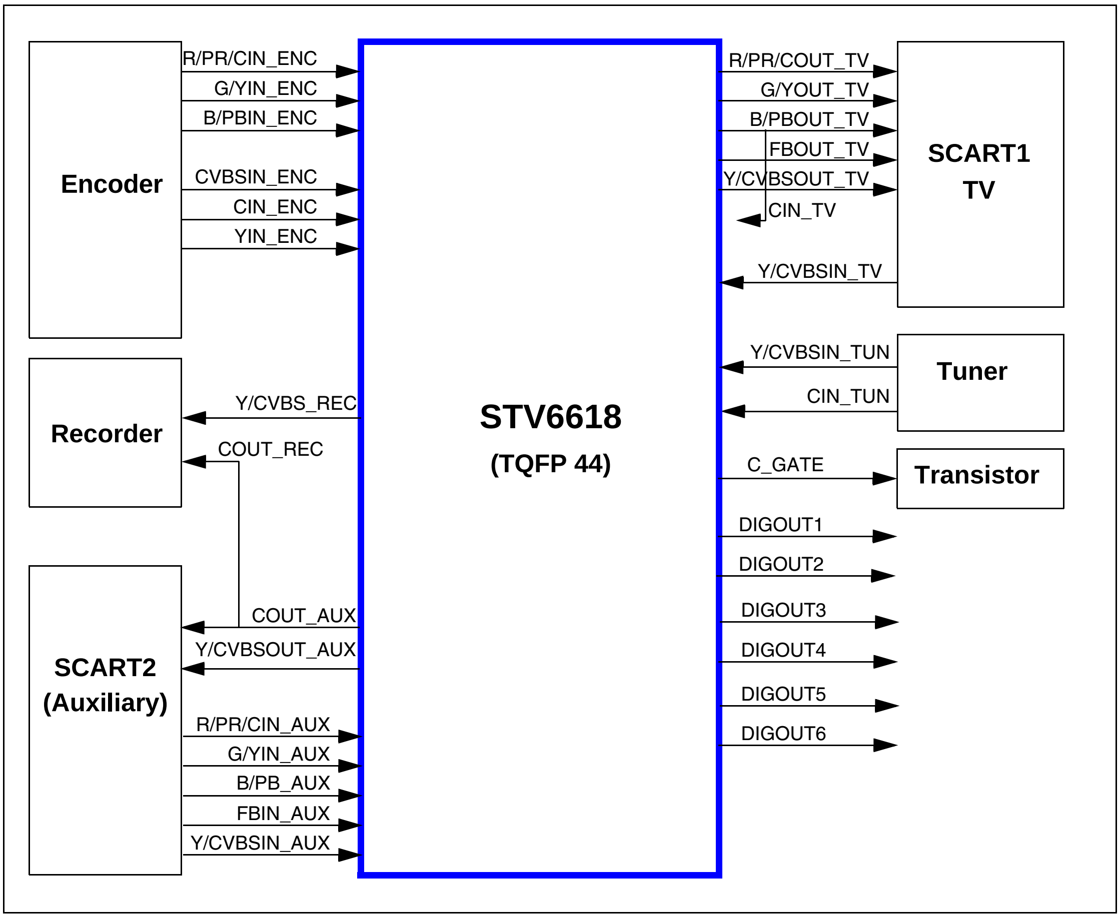
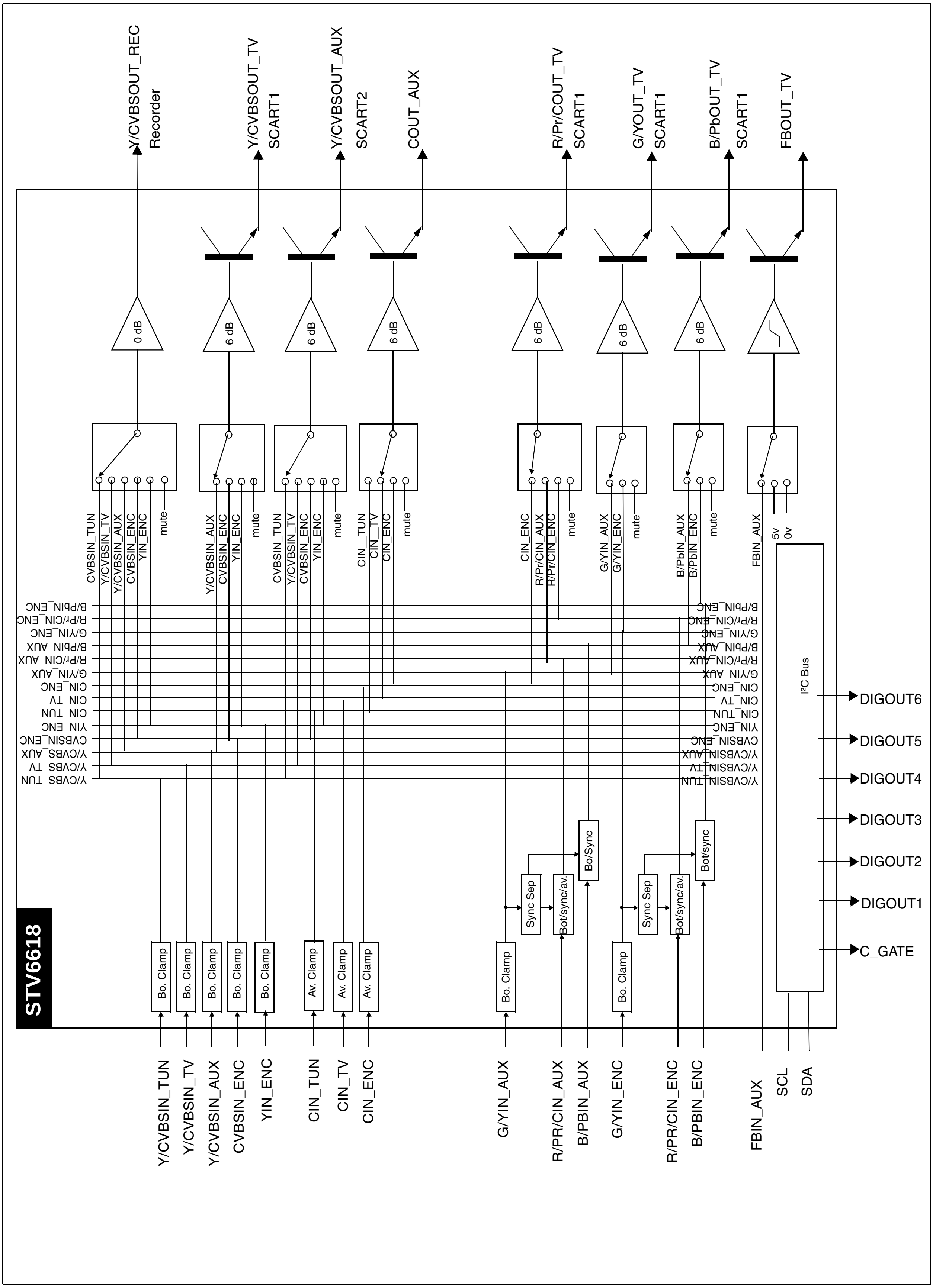
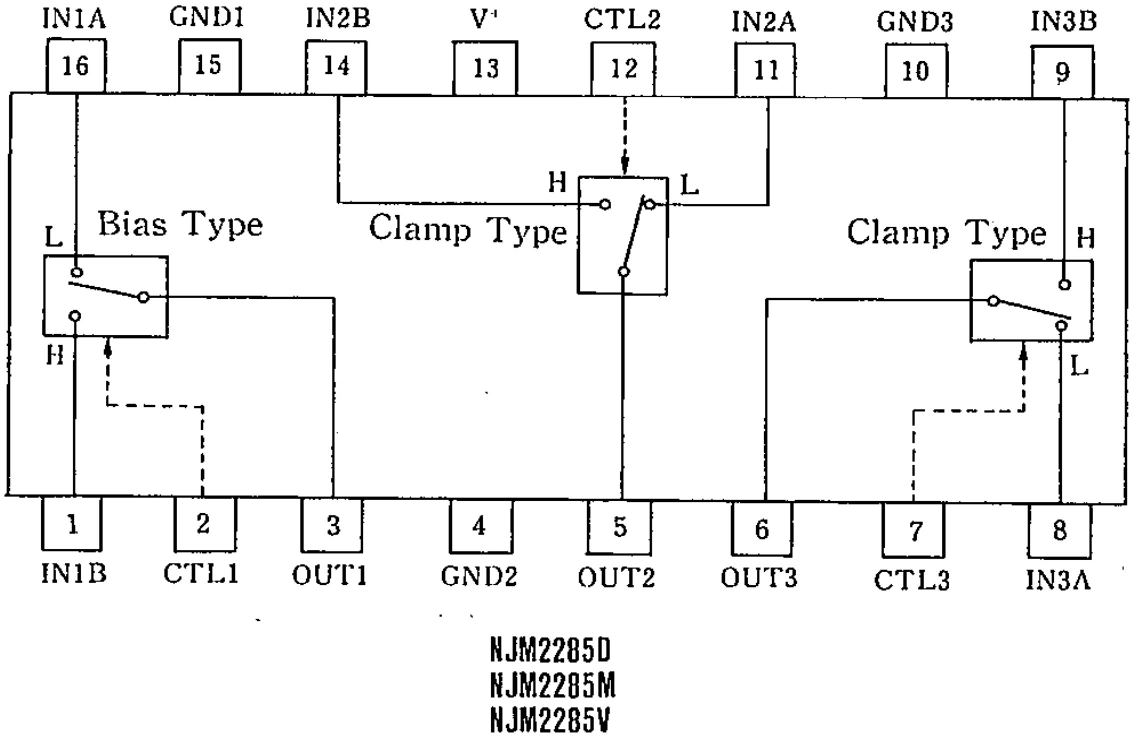


Figure 3: STV6618 Block Diagram



IC7411: NJM2285 Analog Board, Video Switch



IC7313 TEA 1507 Analog Board, Power Supply Control

BLOCK DIAGRAM

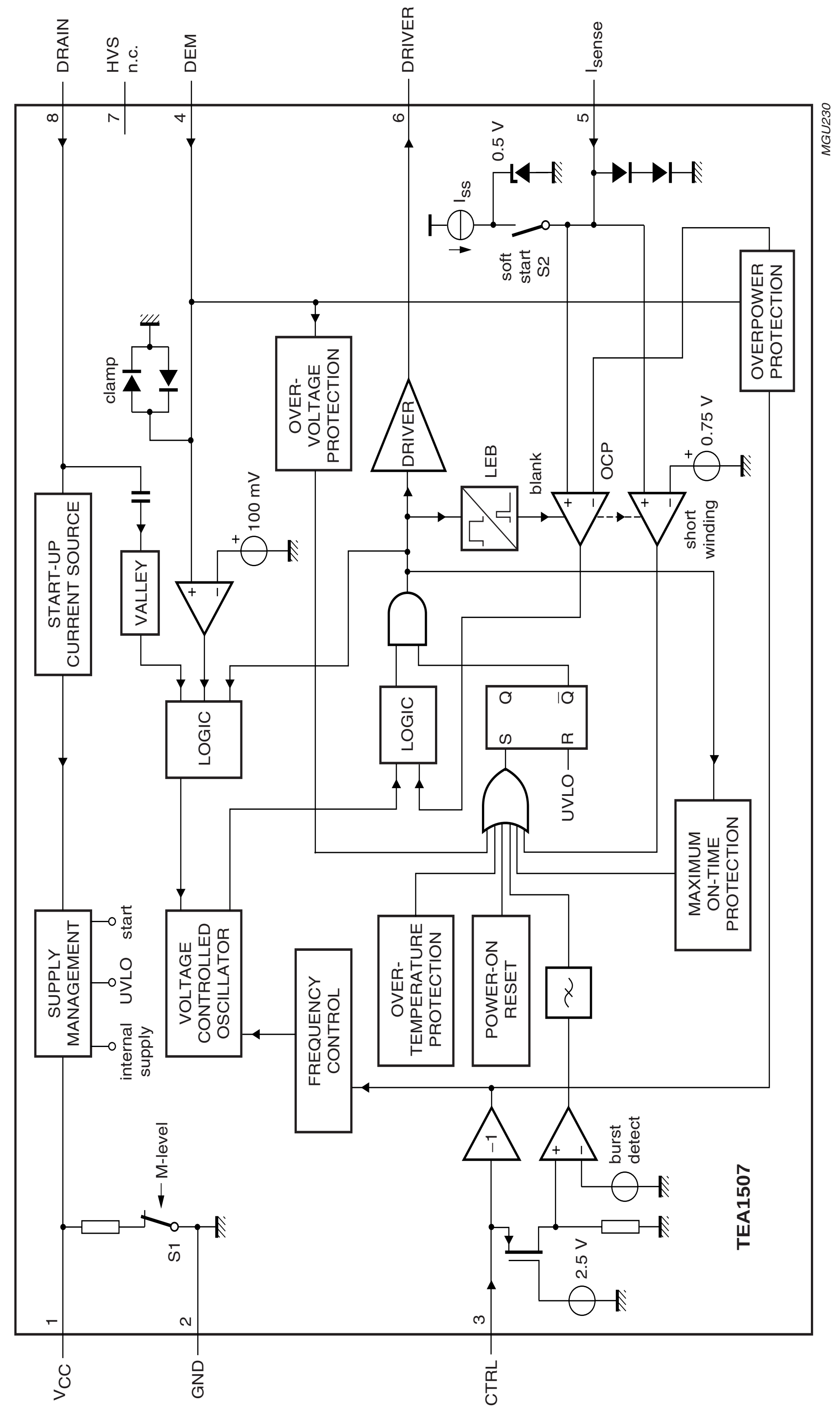
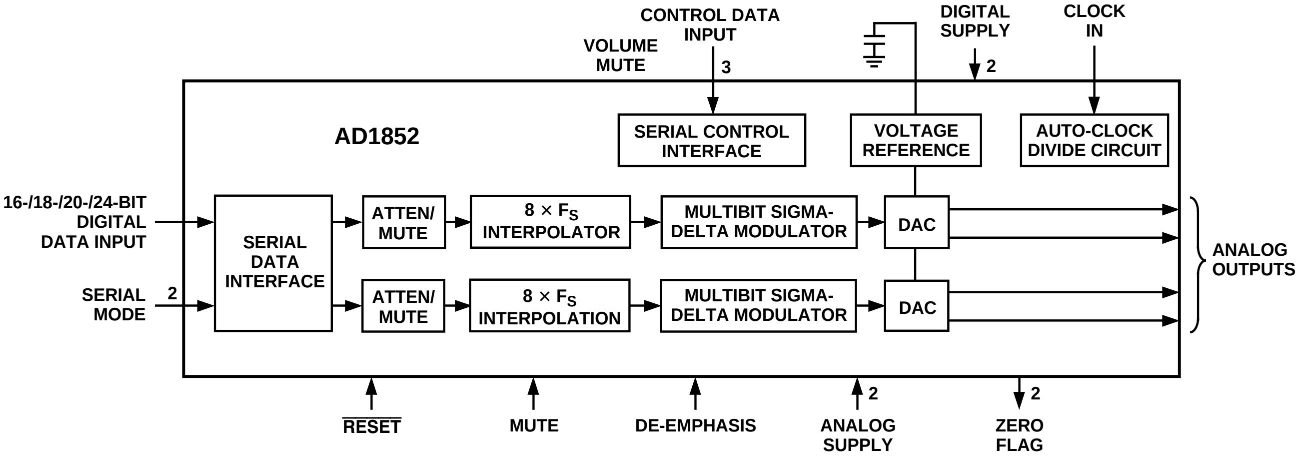


Fig.2 Block diagram.

IC7404: AD1582 Analog Board, Digital/Analogue Converter

FUNCTIONAL BLOCK DIAGRAM



PIN FUNCTION DESCRIPTIONS

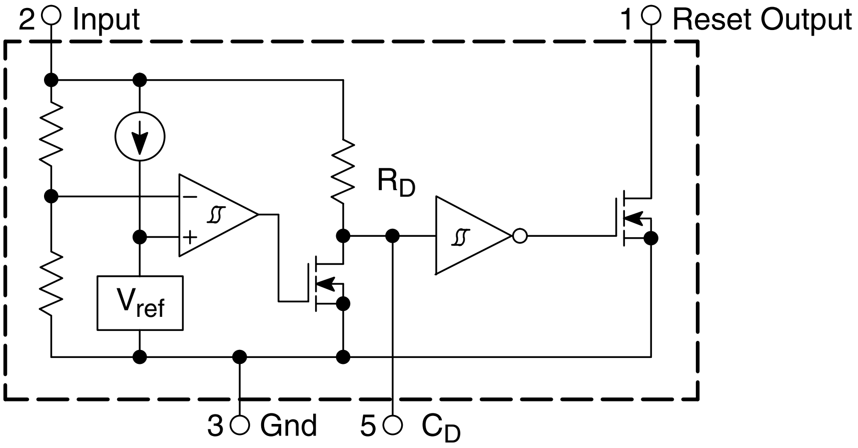
Pin	Input/Output	Pin Name	Description
1	I	DGND	Digital Ground.
2	I	MCLK	Master Clock Input. Connect to an external clock source at either 256 F_S, 384 F_S, 512 F_S, 768 F_S, or 1024 F_S.
3	I	CLATCH	Latch Input for Control Data. This input is rising-edge sensitive.
4	I	CCLK	Control Clock Input for Control Data. Control input data must be valid on the rising edge of CCLK. CCLK may be continuous or gated.
5	I	CDATA	Serial Control Input, MSB first, containing 16 bits of unsigned data per channel. Used for specifying channel-specific attenuation and mute.
6		NC	No Connect.
7	I	$192/\overline{48}$	Selects 48 kHz (LO) or 192 kHz Sample Frequency.
8	O	ZEROR	Right Channel Zero Flag Output. This pin goes HI when Right Channel has no signal input for more than 1024 LR Clock Cycles.
9	I	DEEMP	De-Emphasis. Digital de-emphasis is enabled when this input signal is HI. This is used to impose a 50 µs/15 µs response characteristic on the output audio spectrum at an assumed 44.1 kHz sample rate. Curves for 32 kHz and 48 kHz sample rates may be selected via SPI control register.
10	I	$96/\overline{48}$	Selects 48 kHz (LO) or 96 kHz Sample Frequency.
11, 15	I	AGND	Analog Ground.
12	O	OUTR+	Right Channel Positive Line Level Analog Output.
13	O	OUTR–	Right Channel Negative Line Level Analog Output.
14	O	FILTR	Voltage Reference Filter Capacitor Connection. Bypass and decouple the voltage reference with parallel 10 µF and 0.1 µF capacitors to the AGND.
16	O	OUTL–	Left Channel Negative Line Level Analog Output.
17	O	OUTL+	Left Channel Positive Line Level Analog Output.
18	I	AVDD	Analog Power Supply. Connect to Analog 5 V Supply.
19		FILTB	Filter Capacitor Connection. Connect 10 µF capacitor to AGND (Pin 15).
20	I	IDPM1	Input Serial Data Port Mode Control One. With IDPM0, defines 1 of 4 serial modes.
21	I	IDPM0	Input Serial Data Port Mode Control Zero. With IDPM1, defines 1 of 4 serial modes.
22	O	ZEROL	Left Channel Zero Flag Output. This pin goes HI when Left Channel has no signal input for more than 1024 LR Clock Cycles.
23	I	MUTE	Mute. Assert HI to mute both stereo analog outputs. Deassert LO for normal operation.
24	I	$\overline{\text{RESET}}$	Reset. The AD1852 is reset on the rising edge of this signal. The serial control port registers are reset to the default values. Connect HI for normal operation.
25	I	$\text{L}/\overline{\text{R}}\text{CLK}$	Left/$\overline{\text{Right}}$ Clock Input for Input Data. Must run continuously.
26	I	BCLK	Bit Clock Input for Input Data. Need not run continuously; may be gated or used in a burst fashion.
27	I	SDATA	Serial Input, MSB first, containing two channels of 16, 18, 20, and 24 bits of twos complement data per channel.
28	I	DVDD	Digital Power Supply Connect to digital 5 V supply.

Table I. Serial Data Input Mode

IDPM1 (Pin 20)	IDPM0 (Pin 21)	Serial Data Input Format
0	0	Right-Justified
0	1	I^2S-Compatible
1	0	Left-Justified
1	1	DSP

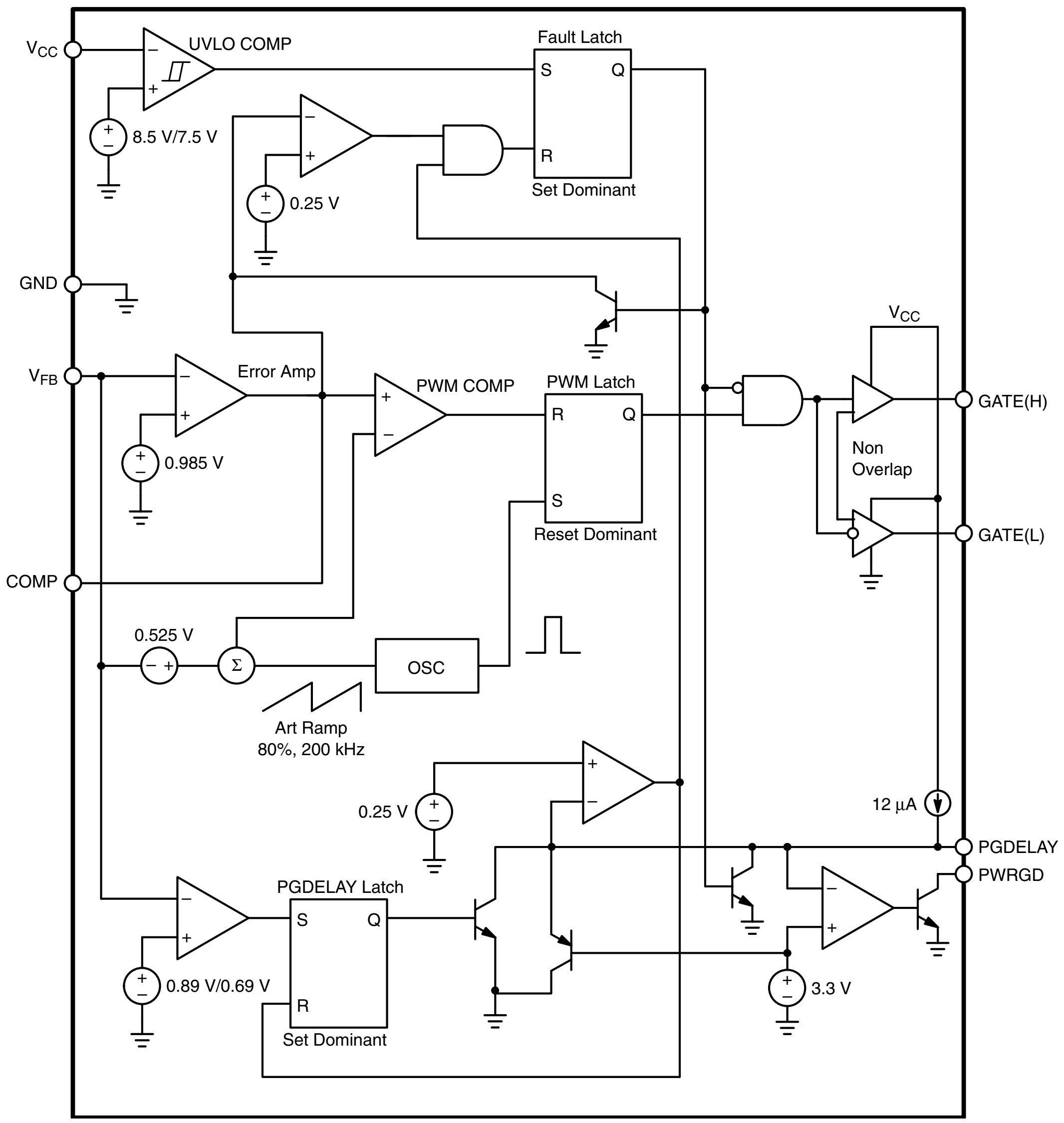
9.8.3 ICs Digital Board Chrysalis

IC7106 NCP303LSN29, Digital Board 2.1 Chrysalis, Reset Circuit



NCP303LSNxxT1
Open Drain Output Configuration

IC7501 NCP1570D, Digital Board 2.1 Chrysalis, DC/DC Converter Control



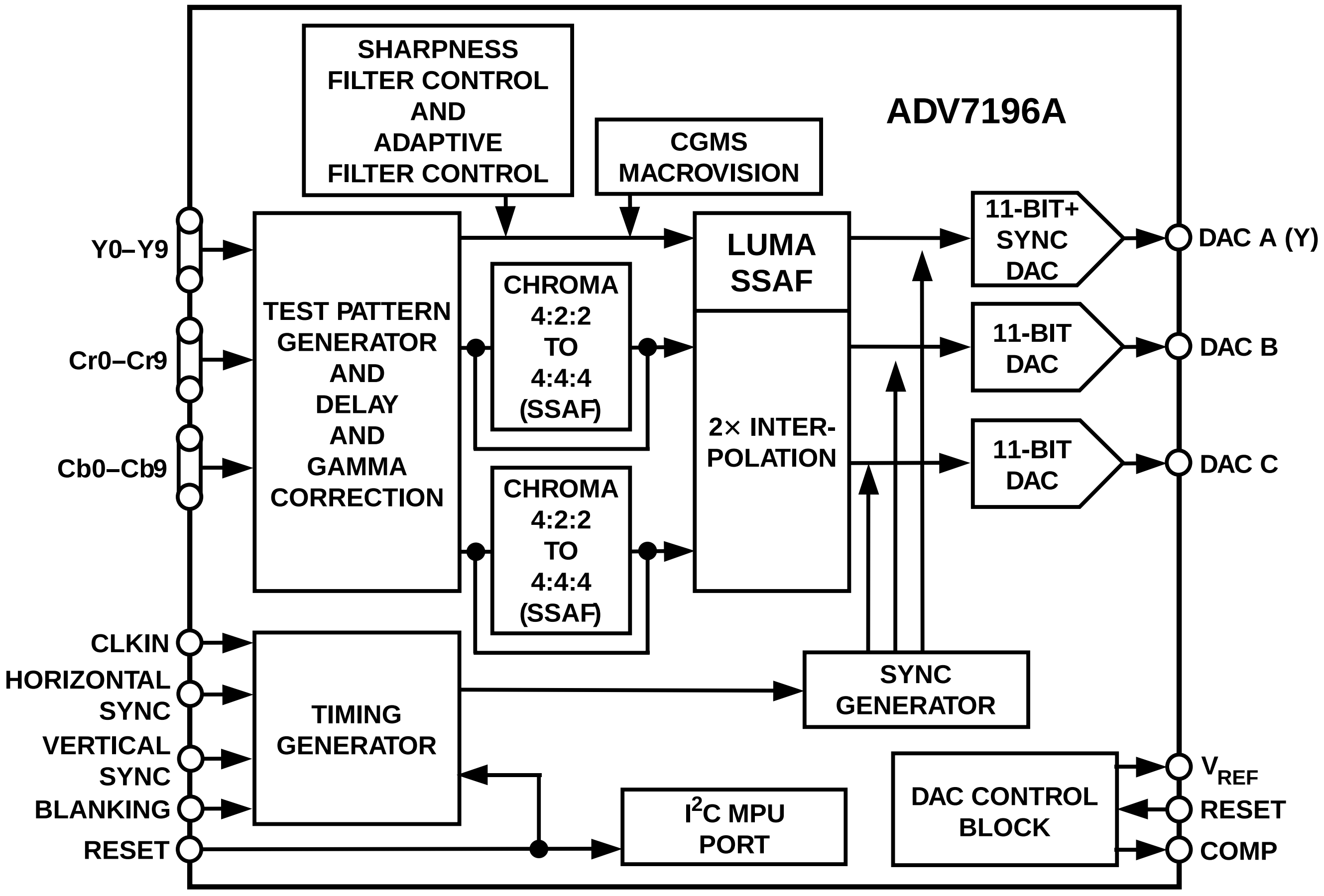
NCP1570

PACKAGE PIN DESCRIPTION

PACKAGE PIN #		
SO–8	PIN SYMBOL	FUNCTION
1	V_{CC}	Power supply input.
2	PWRGD	Open collector output goes low when V_{FB} is out of regulation. User must externally limit current into this pin to less than 20 mA.
3	PGDELAY	External capacitor programs PWRGD low–to–high transition delay.
4	COMP	Error amp output. PWM comparator reference input. A capacitor to LGND provides error amp compensation and Soft Start. Pulling pin < 0.45 locks gate outputs to a zero percent duty cycle state.
5	GATE(H)	High–side switch FET driver pin. Capable of delivering peak currents of 1.5 A.
6	GATE(L)	Low–side synchronous FET driver pin. Capable of delivering peak currents of 1.5 A.
7	V_{FB}	Error amplifier and PWM comparator input.
8	GND	Power supply return.

IC7703 ADV7196A, Digital Board 2.1 Chrysalis, Progressive Scan Video Encoder

FUNCTIONAL BLOCK DIAGRAM



ADV7196A

PIN FUNCTION DESCRIPTIONS

Pin	Mnemonic	Input/Output	Function
1, 12	V_{DD}	P	Digital Power Supply
2–11	Y0–Y9	I	10-Bit Progressive Scan/HDTV Input Port for Y Data. Input for G data when RGB data is input.
13, 52	GND	G	Digital Ground
14–23	Cr0–Cr9	I	10-Bit Progressive Scan/HDTV Input Port for Color Data in 4:4:4 Input Mode. In 4:2:2 mode this input port is not used. Input port for R data when RGB data is input.
24, 35	V_{AA}	P	Analog Power Supply
25	CLKIN	I	Pixel Clock Input. Requires a 27 MHz reference clock for standard operation in Progressive Scan Mode or a 74.25 MHz (74.1758 MHz) reference clock in HDTV mode.
26, 33	AGND	G	Analog Ground
27	DV	I	Video Blanking Control Signal Input
28	$\overline{\text{VSYNC}}$/ TSYNC	I	$\overline{\text{VSYNC}}$, Vertical Sync Control Signal Input or TSYNC Input Control Signal in Async Timing Mode
29	$\overline{\text{HSYNC}}$/ $\overline{\text{SYNC}}$	I	$\overline{\text{HSYNC}}$, Horizontal Sync Control Signal Input or $\overline{\text{SYNC}}$ Input Control Signal in Async Timing Mode
30	SCL	I	MPU Port Serial Interface Clock Input
31	SDA	I/O	MPU Port Serial Data Input/Output
32	DAC C	O	Color Component Analog Output of Input Data on Cb/Cr9–0 Input Pins
34	DAC A	O	Y Analog Output
36	DAC B	O	Color Component Analog Output of Input Data on Cr9–Cr0 Input Pins
37	COMP	O	Compensation Pin for DACs. Connect 0.1 µF capacitor from COMP pin to V_{AA}.
38	R_{SET}	I	A 2470 Ω resistor (for input ranges 64–940 and 64–960; output standards EIA-770.1–EIA-770.3) must be connected from this pin to ground and is used to control the amplitudes of the DAC outputs. For input ranges 0–1023 (output standards RS-170, RS-343A) the R_{SET} value must be 2820 Ω.
39	V_{REF}	I/O	Optional External Voltage Reference Input for DACs or Voltage Reference Output (1.235 V)
40	$\overline{\text{RESET}}$	I	This input resets the on-chip timing generator and sets the ADV7196A into Default Register setting. Reset is an active low signal.
41	ALSB	I	TTL Address Input. This signal sets up the LSB of the MPU address. When this pin is tied high, the I^2C filter is activated which reduces noise on the I^2C interface. When this pin is tied low, the input bandwidth on the I^2C interface is increased.
42–51	Cb/Cr9–0	I	10-Bit Progressive Scan/HDTV Input Port for Color Data. In 4:2:2 mode the multiplexed CrCb data must be input on these pins. Input port for B data when RGB is input.

9.9 List of Abbreviations

Analog Board

+5VSTBY	Permanent Supply 5V
8SC2	Pin8 Scart2 (only for Europe)
A_DATA	Data from Analog- to Digital-Board (UART-Communication)
A_RDY	Analog-board ready (status information to digital-board)
A18 - A19	Parallel Address Bus (CC - Flash-ROM and S-RAM)
A8 - A17	Parallel Address Bus (CC - Flash-ROM and S-RAM)
AD0 - AD7	Parallel Address and Data Bus (CC - Flash-ROM and S-RAM)
AFC	Automatic Frequency Control
AFEL	Audio Frontend Left
AFER	Audio Frontend Right
AGC / WSRI	Automatic Gain Control (for Europe), Wide Screen Rear In (for NTSC)
AINFL	Audio In Front Left
AINFR	Audio In Front Right
AKILL	Audio Kill Signal
ALADC	Audio Left to ADC
ALDAC	Audio Left from DAC
ALE	Address Latch Enable
AM0	Adress-mode 0
AM1	Adress-mode 1
ARADC	Audio Right to ADC
ARDAC	Audio Right from DAC
ASCC1M	Audio Scart 1 Mute (System Clock Output for Real time Clock-Adjustment)
AVCC	Power Supply for A/D-converter
AVSS	GND-Pin for A/D-converter
CFIN	Chroma Front In
CS0_	Chip Select 0 (CC - S-RAM)
CS2_	Chip Select 2 (CC - Flash-ROM)
CVBSFIN	Video Front In
D_DATA	Data from Digital- to Analog-Board (UART-Communication)
D_RDY	Digital-board ready (status information from digital-board)
DAC_MUTE	Mute Signal for DAC
DAOUT	Digital Audio Out
DVAL	Audio from Digital Video In Left
DVAR	Audio from Digital Video In Right
DVCC1	Power Supply Pin
DVCC2	Power Supply Pin
DVCC3	Power Supply Pin
DVSS1	GND Pin
DVSS2	GND Pin
DVSS3	GND Pin
FAN_OFF	Fan for Basic engine
FBIN	Fast Blanking input
FOME	FOllow ME Status line (matching signals yes/no; only for Europe)
G1…10	DISPLAY GRID
INT	Interrupt OUT for the CC
INT	Interrupt – line from Display Print
ION	Inverse ON-Line
IPFAIL	Inverse Power Fail Detection
IPOR	Inverse Power On Reset
IRESET	Inverse Reset Input
IRR	Signal from IR-Receiver
K1	Key-Input-Line
K2	Key-Input-Line
KILL	Audio Mute
P50 IN	P50 INput-line (only for Europe)
P50 OUT	P50 OUTput-line (only for Europe)
POR_DC	Power On Reset for Display Control Print (Ext_DL)
PSS	Pal/Secam-Select
PWM_FIL	Control line for Filament Voltage Generation
PWONSW	Amplifier Switch Audio A/D Converter
RD_	Output Enable ReaD (CC - Flash-ROM and S-RAM)
RECLED	Control Signal for REC-LED
RESET_DIG	Reset Line to Digital Board
RP_	Inverse Reset line to Flash-ROM
RSA1/2	Record Selector 1/2
RY/BY_	Ready/Busy – input line (from Flash-ROM)
SIF1	Sound intermediate frequency
SB1	Secam Band 1 (PCB-Test entrance)
SCL	I^2C-Bus
SCLSW	Switched I^2C-Bus
SDA	I^2C-Bus
SDASW	Switched I^2C-Bus
SFS_TS	SAW Filter Select Trap Select
STBY	Standby-Line (Flash_Toshiba)
SYNC	Video Sync input
TEMP_SENSE	Temperature Sense Line
VER	HW-version input
VFV	Video from Frontend
VKK	VFT Driver Power Supply
VREFH	Pin for Reference-voltage input to A/D-converter
VREFL	Pin for Reference-voltage input to A/D-converter
VS1/2	View Selector 1/2
WR_	Write Enable (CC - Flash-ROM and S-RAM)
WSFI	Wide Screen Signalling Front In
WU	Wake Up
X1	Oscillator Pin
X2	Oscillator Pin
XIN	Oscillator Pin
XOUT	Oscillator Pin
XT1	Low Frequency Oscillator Pin
XT2	Low Frequency Oscillator Pin
YFIN	Luminance Front In

Digital Board Chrysalis

ADC	:Analog to Digital Converter
DAC	:Digital to Analog Converter
DENC	:Digital (Video) Encoder (Video DAC)
DV	: Digital Video (Camcorder)
EF	: Emitter Follower
OSD	:On-Screen Display
VIP	:Video Input Processor (Video ADC)
2Fh	: Progressive scan video
2V5	+2V5 Power supply for Link+Codec IC7431
3V3	+3V3 Power supply
3V3_A	+3V3 Analog power supply for PHY IC7400
3V3_D	+3V3 Digital power supply for PHY IC7400
3V3_DLY	+3V3 Power supply for IC7500
3V3_LINK	+3V3 Power supply for Link+Codec IC7431
3V3_F	+3V3 Power supply for optional Flash memory IC7432
3V3_RAM	+3V3 Power supply for SDRAM IC7430
3V3_uP	+3V3 Power supply for Micro-controller IC7802
3V3_32kHz	+3V3 Power supply for audio format adaptation circuitry IC7507 and IC7508
3V3_AC	+3V3 Power supply for audio system clock generator IC7605 and IC7606

+5V	+5V Power supply
5V_PLL	+5V Power supply for VCO of audio PLL IC7604
A (1:17)	Flash address lines of uPD72893
A_MUTE	Audio Mute
ABCK	Audio Bit Clock
AD (1:10)	Address bus lines for Host I/F of Link+Codec IC7431
AEMP1	PCM1 emphasis ON/OFF for PCM1 output
AFS1	Audio sampling frequency indication signal
ALRCLK	Audio Word Select
AMCLK44	11.2896MHz (=256 * 44.1 kHz) audio master clock signal for 44.1 kHz audio
AMCLK48	12.288MHz (=256 * 48 kHz) audio master clock signal for 32 kHz and 48 kHz audio
APWM	PWM signal for audio PLL
ASIC	Application Specific Integrated Circuit
BUFENn_AUD	Buffer Enable Audio
BUFENn_VID	Buffer Enable Video
CLK27M_CON	27MHz Clock to Digital Board
CS	Parallel interface chip select input of Link+Codec IC7431
CTL (0:1)	Link interface control lines
CTSN	Clear to Send
D (0:15)	Flash data lines of Link+Codec IC7431
DCDi	Directional Correlational Deinterlacing. Circuitry that reduces jaggies on diagonal edges when deinterlacing video-sourced material.
DV_STATUS	Interrupt pin for reading DV-status
HS_CLK	Video clock input of Link+Codec IC7431
INT	Interrupt request output of Link+Codec IC7431 (input to Micro-Controller)
IOR	Parallel interface IO read control input of Link+Codec IC7431
ISPN	In System Programming signal (used for programming IC7802)
LKON	Link-on signal output
LPS	Link power status input
LREQ	Link request input
MA (0:10)	SDRAM address lines of Link+Codec IC7431
MCAS	SDRAM column address strobe signal
MCLK	SDRAM clock signal
MD (0:15)	SDRAM data lines of Link+Codec IC7431
MRAS	SDRAM row-address strobe signal
MWE	SDRAM write enable signal
PCM1	Audio Serial Data Output of Link+Codec IC7431
PCM1_NEW	'MSB justified' to I2S converted audio serial data; audio serial data input of audio DAC UDA1334A
PD (0:15)	Data bus lines for Host I/F of Link+Codec IC7431
PHY_D (0:7)	Data bus connection between PHY and LINK device
RESETn	DVIO board reset
RESET_FM	Reset signal driven by Flashmaster programming device
RESTB	Reset input of Link+Codec IC7431
RTSN	Request to Send
RWZ	Parallel interface read/write control input of Link+Codec IC7431
RXD	Receive Data
SCLK	Link control output clock
TXD	Transmit Data
VPP	+10V switchable programming voltage of microcontroller
YUV (0:7)	Digital Video

10. Spare Parts List

10.1 Exploded View of the Set

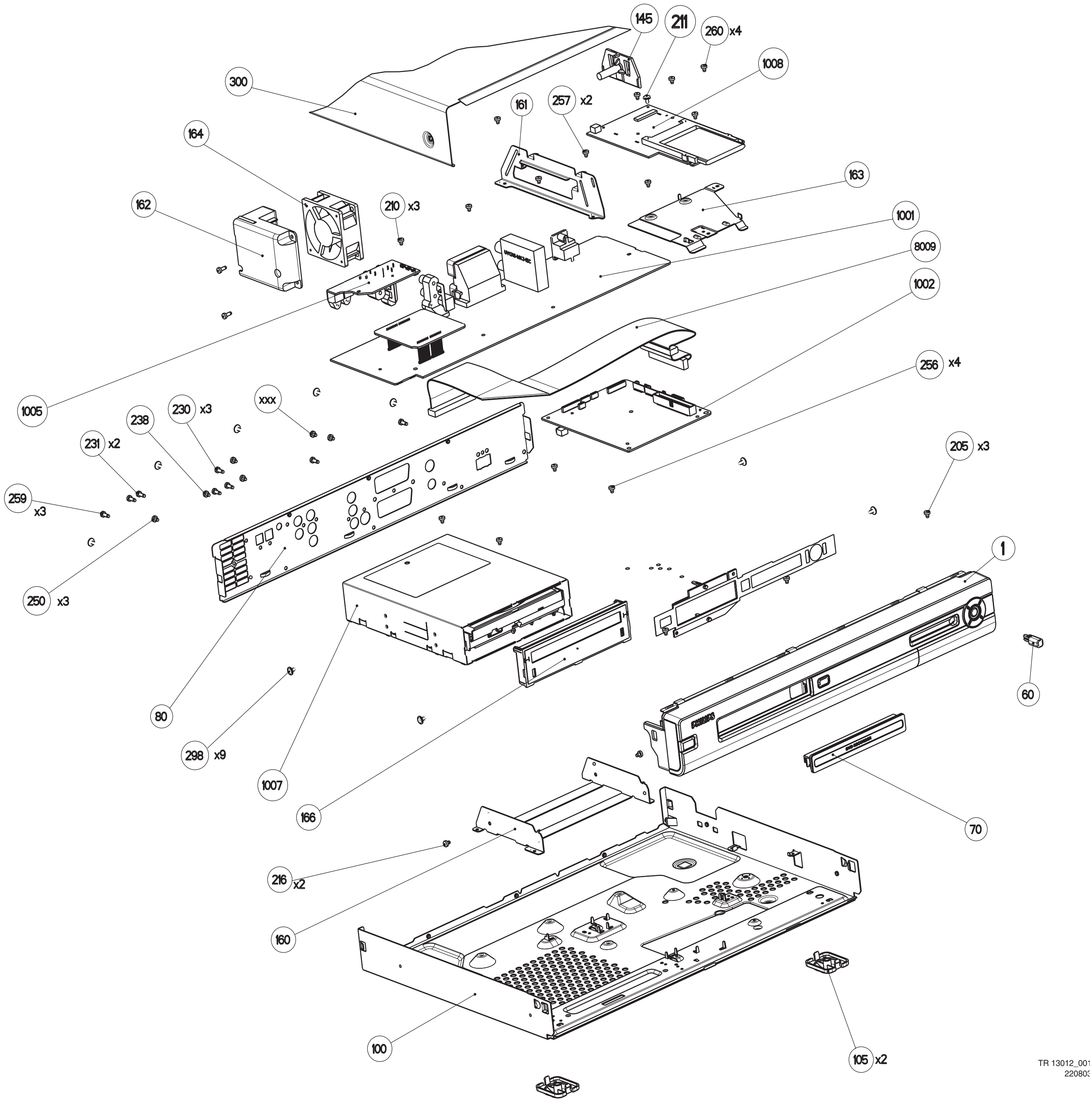


Figure 10-1

10.2 Exploded View of the Front Panel Complete

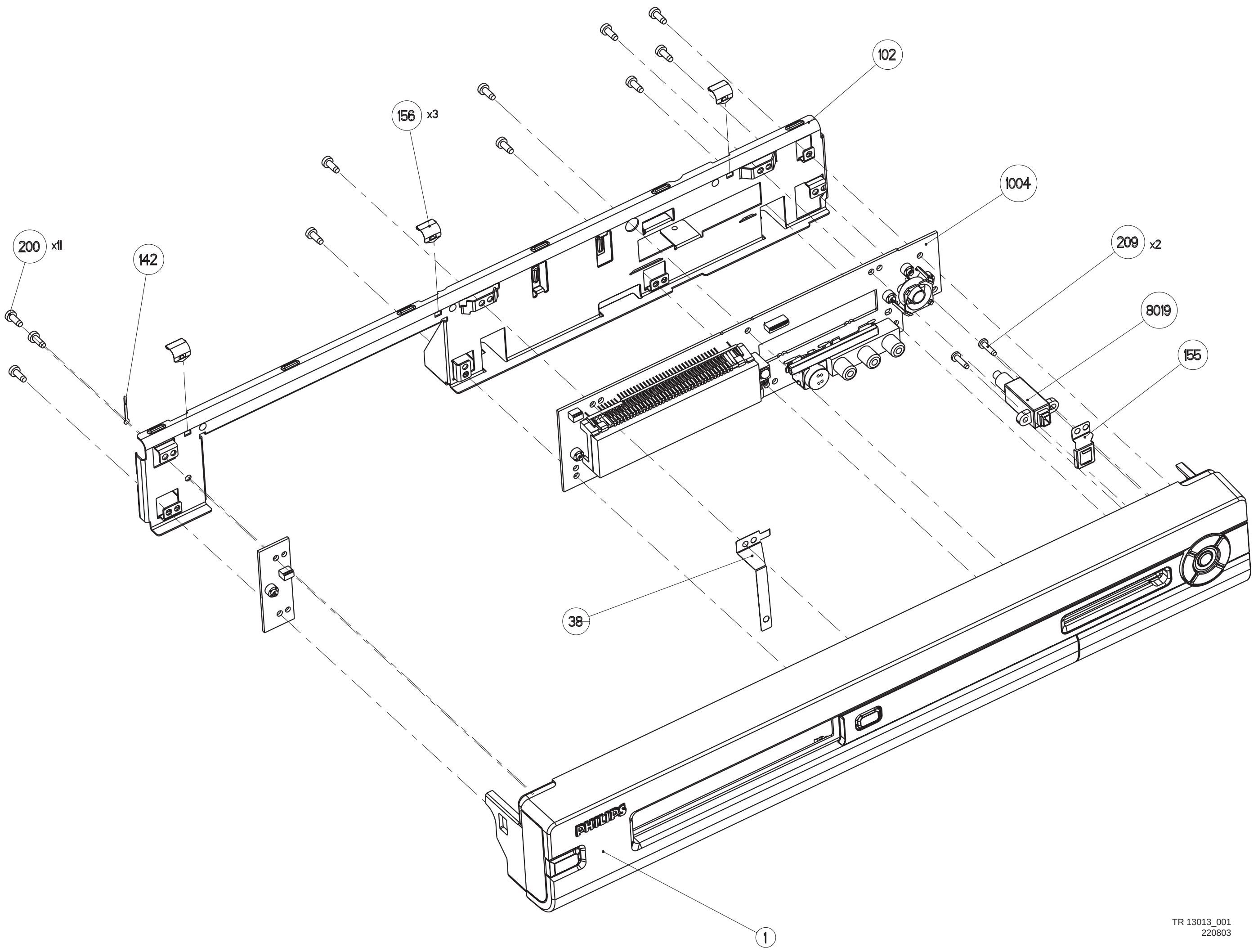


Figure 10-2

10.3 Exploded View of the Front without PWBs

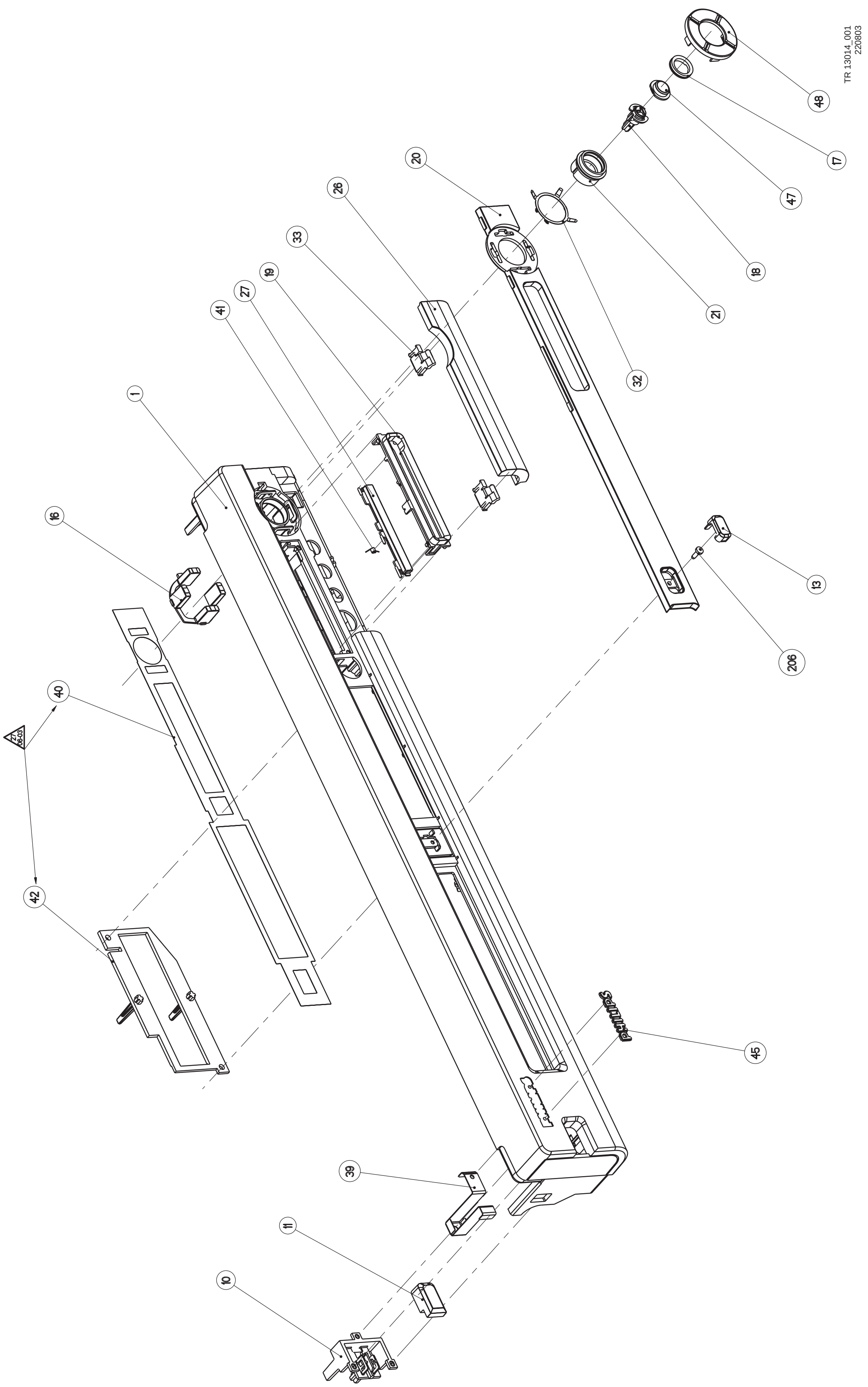


Figure 10-3

Mechanical

Various

0001	3103 607 90511	PANEL FRONT ASSY 77/EU
0011	3103 607 50341	BUTTON CAP STAND BY
0013	3103 607 50361	BUTTON CAP OPEN CL.
0020	3103 607 50611	WINDOW DISPLAY ASSY
0026	3103 607 50931	DOOR FRONT AV ASSY
0033	3103 604 00441	HINGE DOOR FRONT AV
0047	3103 607 50411	BUTTON CAP RECORD
0048	3103 607 50991	RING ROCKER PLAY PAUSE ASSY
0070	3103 607 90411	COVER TRAY ASSY
0161	3103 601 00431	FFC 22-POL-A-TYP 245MM (AB-DB)
0164	3103 308 52950	FAN KD120 6PTS 3 - C112
0165	3103 607 90431	BUTTON EJECT ASSY
0300	3103 607 50681	COVER ASSY
0350	3128 147 15411	RC19046005/01
0351	2422 070 98133	MAINSCORD EUR 1M5 BK
0352	2422 076 00532	SCART CABLE
0357	4822 320 50377	CONNECT. CABLE PAL
1008	2822 062 41022	CARD READER WRITER IIA
8004	3103 601 00220	FFC 10-POL-D-TYP 350MM (UP-DB)
8005	3103 601 00230	FFC 22-POL-A-TYP 210MM (AB-DB)
8008	3103 601 00441	CBLE KR 12P/130/12P UL
8009	3103 601 00461	CBLE IDE 40P/470/40P UL
8010	3103 601 00280	FFC 10-POL-A-TYP 650MM (AB-DC)
8012	3103 601 00471	CBLE EHR 4P/180/4P LC UL
8013	3103 601 00310	KR 9POL GESCH 370MM
8019	3103 601 00360	IEEE 1394 CHRYSALIS 350MM
8020	3103 601 00370	FFC 6-POL-D-TYP 220MM (DIO-DB)
8026	3103 601 00431	FFC 22-POL-A-TYP 245MM (AB-DB)
8028	3103 601 00481	CBLE KR 2P/230/2P KR UL
8029	3103 601 00320	FFC 7-POL-D-TYP 280MM (DIO-EP)

Display Board

Various

1110	4822 242 82114	EFOEC8004/T4
1130	4822 276 13732	Tact switch
1165	4822 276 13732	Tact switch
1166	4822 276 13732	Tact switch
1167	4822 276 13732	Tact switch
1168	4822 276 13732	Tact switch
1169	4822 276 13732	Tact switch
1170	4822 276 13732	Tact switch
1910	4822 267 11031	10P. FEM. V
1911	3103 601 00180	CABLE TREE ASSY 2 POL
1920	2422 026 05301	SOC CINCH V 3P
1921	2422 026 05307	CON MDIN H 4P F YKF51 B
1922	2422 025 10185	CON BM H 9P M 2.00 PH B

⊣⊢

2100	5322 126 11583	10nF 10% 50V 0603
2101	3198 017 34730	47nF 16V 0603
2102	4822 124 11946	22µF 20% 16V
2103	5322 126 11583	10nF 10% 50V 0603
2104	2238 586 59812	100nF 20-80% 50V 0603
2110	4822 124 21732	10µF 20% 25V
2111	3198 017 34730	47nF 16V 0603
2112	4822 126 13879	220nF 20% 16V
2113	5322 121 42498	680nF 5% 63V
2114	5322 126 11578	1nF 10% 50V 0603
2115	3198 024 44730	47nF 50V 0603
2116	4822 124 11946	22µF 20% 16V
2117	4822 124 81151	22µF 50V
2118	2020 552 94427	100pF 5% 50v 0603
2119	2020 552 94427	100pF 5% 50v 0603
2120	2020 552 94427	100pF 5% 50v 0603
2121	2020 552 94427	100pF 5% 50v 0603
2122	2020 552 94427	100pF 5% 50v 0603
2123	2020 552 94427	100pF 5% 50v 0603
2124	2020 552 94427	100pF 5% 50v 0603
2125	2020 552 94427	100pF 5% 50v 0603
2126	2020 552 94427	100pF 5% 50v 0603
2200	4822 126 14241	330pF 50V 0603
2201	4822 126 14241	330pF 50V 0603
2202	2238 586 59812	100nF 20-80% 50V 0603

-WW-

3100	4822 051 30223	22kΩ 5% 0.062W
3101	4822 051 30223	22kΩ 5% 0.062W
3102	4822 051 30222	2.2kΩ 5% 0.062W
3103	4822 051 30221	220Ω 5% 0.062W
3104	4822 051 30103	10kΩ 5% 0.062W
3106	4822 117 12925	47kΩ 1% 0.063W 0603
3107	4822 051 30222	2.2kΩ 5% 0.062W
3108	4822 117 12925	47kΩ 1% 0.063W 0603
3110	4822 051 30221	220Ω 5% 0.062W
3111	4822 051 30223	22kΩ 5% 0.062W
3112	4822 050 11002	1kΩ 1% 0.4W
3113	4822 051 30102	1kΩ 5% 0.062W
3114	4822 051 30101	100Ω 5% 0.062W
3115	4822 051 30101	100Ω 5% 0.062W
3116	4822 051 30331	330Ω 5% 0.062W
3117	4822 051 30103	10kΩ 5% 0.062W
3118	4822 051 30331	330Ω 5% 0.062W
3119	4822 051 30471	470Ω 5% 0.062W
3120	4822 051 30102	1kΩ 5% 0.062W
3121	4822 116 83872	220Ω 5% 0.5W
3122	4822 051 30103	10kΩ 5% 0.062W
3123	4822 051 30471	470Ω 5% 0.062W
3124	4822 051 30103	10kΩ 5% 0.062W
3125	4822 051 30471	470Ω 5% 0.062W
3126	4822 051 30101	100Ω 5% 0.062W
3127	4822 117 13632	100kΩ 1% 0603 0.62W
3128	4822 117 13632	100kΩ 1% 0603 0.62W
3130	4822 051 30103	10kΩ 5% 0.062W
3132	4822 051 30102	1kΩ 5% 0.062W
3134	4822 117 12063	NTC DC 5W 10K 5%
3137	4822 116 83876	270Ω 5% 0.5W
3139	4822 116 83876	270Ω 5% 0.5W
3141	4822 117 12925	47kΩ 1% 0.063W 0603
3144	4822 051 30103	10kΩ 5% 0.062W
3147	4822 051 30223	22kΩ 5% 0.062W
3148	4822 051 30223	22kΩ 5% 0.062W
3149	4822 051 30223	22kΩ 5% 0.062W
3150	4822 051 30223	22kΩ 5% 0.062W
3151	4822 051 30223	22kΩ 5% 0.062W
3152	4822 051 30223	22kΩ 5% 0.062W
3153	4822 051 30223	22kΩ 5% 0.062W
3200	4822 051 30102	1kΩ 5% 0.062W
3201	4822 051 30105	1MΩ 5% 0.062W
3202	4822 051 30102	1kΩ 5% 0.062W
3203	4822 051 30105	1MΩ 5% 0.062W
3204	4822 051 30689	68Ω 5% 0.063W 0603
3205	4822 051 30759	75Ω 5% 0.062W
3206	4822 051 30759	75Ω 5% 0.062W
3207	4822 051 30759	75Ω 5% 0.062W
3300	4822 051 30472	4.7kΩ 5% 0.062W
4112	4822 051 30008	Jumper 0603
4113	4822 051 20008	Jumper 0805
4121	4822 051 30008	Jumper 0603
4122	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603

⌒⌒

5100	4822 157 11706	10µH 5%
5101	2422 549 44607	Bead 600Ω at 100MHz
5103	2422 549 44607	Bead 600Ω at 100MHz
5104	4822 157 50964	100µH 20%

▷|

6100	4822 130 11416	PDZ6.8B
6101	9322 190 44676	LTL-1MHHR
6102	9322 190 44676	LTL-1MHHR
6103	9322 190 44676	LTL-1MHHR
6105	4822 130 11397	BAS316
6106	4822 130 11397	BAS316
6111	4822 130 11397	BAS316
6200	9322 146 61685	DF3A6.8FU
6201	9322 146 61685	DF3A6.8FU
6202	9322 146 61685	DF3A6.8FU
6203	9322 146 61685	DF3A6.8FU
6204	9322 146 61685	DF3A6.8FU

⊗▭

7100	2722 171 07736	VFD BJ900GNK
7101	3198 010 42310	BC847BW
7102	3198 010 42310	BC847BW
7103	3103 165 13731	TMP87C874F/LDCP1
7104	3198 010 42310	BC847BW
7105	3198 010 42310	BC847BW
7106	4822 130 40981	BC337-25
7107	9322 185 95667	TSOP4836
7108	4822 130 41246	BC327-25
7109	3198 010 42310	BC847BW
7112	4822 130 60854	DTA124EU-W

Analog Board

Various

1001▲	2422 086 10919	Fuse 65V 125mA
1300▲	2422 086 10899	FUSE5X20ET1A25 250V IEC B
1301▲	4822 265 11253	Fuse holder 2p
1302▲	4822 252 11215	Spark gap
1303▲	4822 071 51002	19372(1A)
1304▲	2422 086 10786	FUSE 4A
1304▲	9965 000 07786	Fuse T4.0A 250V
1306▲	2422 086 10919	Fuse 65V 125mA
1307▲	4822 071 51002	19372(1A)
1308▲	2422 086 10951	PROT DEV 65V 500MA PSC
1308▲	4822 252 51187	19398E1(0,500A)
1309▲	2422 086 10783	FUSE RAD LT 2A 250V IEC A
1309▲	9965 000 07788	FUSE RAD T2A IEC UL250V
1600	4822 242 10434	Crystal 18.432 MHz
1701	4822 242 81436	Filter OFWK3953M
1702	2422 549 44341	SAW 38.9MHz OFWK9656M
1703	4822 242 10307	OFWG3956M
1704	2422 549 44611	FIL CER 5MHZ5 TPSR*MBQ2 BS A
1704	4822 242 72586	TPS5,5MB-TF20
1705	3139 147 17001	TUNER UV1316MK3
1900	2422 025 18009	Connector 22P
1900	4822 265 11154	Connector 22p
1931▲	2422 030 00304	Socket 2P m h mains
1932	2422 025 10772	CON BM V 12P M 2.00 PH B
1934	4822 267 10565	Connector 4p
1935	5322 268 90415	B2B-PH-K
1940	2422 033 00334	CON BM EURO H 42P
1942	2422 025 10769	CON BMT 9P VERT PH-B
1943	2422 025 18143	CON V 10P F 1.00 FFC 0.3
1943	4822 267 11031	10P. FEM. V
1947	2422 025 18009	Connector 22P
1947	4822 265 11154	Connector 22p
1948	4822 267 10994	Socket SVHS
1949	2422 026 05308	SOC CINCH H 3P
1990	4822 242 73552	13,875 000 MC

⊣⊢

2000	4822 124 80483	47µF20% 6,3V
2001	4822 124 42234	100µF 20% 6,3V
2002	4822 124 42234	100µF 20% 6,3V
2003	2238 586 59812	100nF 20-80% 50V 0603
2004	2238 586 59812	100nF 20-80% 50V 0603
2006	2238 916 11449	1NF 2% NPO 25V 0603
2008	2238 916 11449	1NF 2% NPO 25V 0603
2009	2020 552 94427	100pF 5% 50v 0603
2011	2238 586 59812	100nF 20-80% 50V 0603
2012	2238 586 59812	100nF 20-80% 50V 0603
2016	4822 124 22652	2.2µF 20% 50V
2017	2020 552 94427	100pF 5% 50v 0603
2018	4822 124 21732	10µF 20% 25V
2019	4822 124 21732	10µF 20% 25V
2020	4822 124 21732	10µF 20% 25V
2021	2238 586 59812	100nF 20-80% 50V 0603
2023	2238 916 11449	1NF 2% NPO 25V 0603
2025	2238 916 11449	1NF 2% NPO 25V 0603
2030	2238 916 11449	1NF 2% NPO 25V 0603
2032	2238 916 11449	1NF 2% NPO 25V 0603
2033	2020 552 94427	100pF 5% 50v 0603
2035	2238 586 59812	100nF 20-80% 50V 0603
2037	2238 586 59812	100nF 20-80% 50V 0603
2038	4822 124 42234	100µF 20% 6,3V
2041	2020 552 94427	100pF 5% 50v 0603
2042	2238 586 59812	100nF 20-80% 50V 0603
2043	4822 124 80483	47µF20% 6,3V
2045	2238 916 11449	1NF 2% NPO 25V 0603
2047	2238 916 11449	1NF 2% NPO 25V 0603
2048	2020 009 90097	100µF BP 16V 20%
2048	2022 036 00005	10µF 16V 20%
2048	4822 124 12392	47?F 20% 16V
2049	5322 126 11583	10nF 10% 50V 0603
2050	2020 009 90097	100µF BP 16V 20%
2050	2022 036 00005	10µF 16V 20%
2050	4822 124 12392	47?F 20% 16V
2301▲	2020 554 90173	2.2nF 20% 250V
2302▲	4822 121 10512	220nF 275V 20%
2303	4822 122 31175	1nF 10% 500V
2304▲	4822 121 51598	2.2nF 5% 400V
2305	2020 021 91506	1000µF 20% 16V
2306	2020 021 91528	560µF 6V3 20%
2307	4822 122 31175	1nF 10% 500V

2308	2022 318 00108	47nF 250V 10%
2308	4822 121 70386	47nF 10% 250V
2309⚠	2222 151 90053	68µF 400V 20%
2310	5322 126 11578	1nF 10% 50V 0603
2311	5322 126 11578	1nF 10% 50V 0603
2312	2020 021 91506	1000µF 20% 16V
2313	2020 021 91528	560µF 6V3 20%
2315⚠	4822 126 14525	47pF 5% 1kV
2317	5322 126 11578	1nF 10% 50V 0603
2318	4822 126 10206	2.2nF 10% 500V
2319	2020 021 91506	1000µF 20% 16V
2320	4822 124 40849	330µF 20% 16V
2321	2238 586 59812	100nF 20-80% 50V 0603
2322⚠	2020 021 91506	1000µF 20% 16V
2323	4822 124 42234	100µF 20% 6,3V
2324	2238 586 59812	100nF 20-80% 50V 0603
2325	4822 124 81151	22µF 50V
2326	4822 121 41857	10nF 5% 250V
2327	2238 586 59812	100nF 20-80% 50V 0603
2328	4822 124 81151	22µF 50V
2329	2238 586 59812	100nF 20-80% 50V 0603
2330	5322 126 11578	1nF 10% 50V 0603
2331	2238 586 59812	100nF 20-80% 50V 0603
2332	4822 124 22651	1µF 20% 50V
2334	2238 586 59812	100nF 20-80% 50V 0603
2335	4822 124 21732	10µF 20% 25V
2336	2238 586 59812	100nF 20-80% 50V 0603
2338	2238 586 59812	100nF 20-80% 50V 0603
2339	3198 017 41050	1µF 10V 0603
2340⚠	2020 554 90169	470pF 250V 10%
2341	3198 017 41050	1µF 10V 0603
2342	3198 017 41050	1µF 10V 0603
2343	2238 586 59812	100nF 20-80% 50V 0603
2402	2238 586 59812	100nF 20-80% 50V 0603
2403	4822 124 80483	47µF20% 6,3V
2404	2238 586 59812	100nF 20-80% 50V 0603
2405	4822 124 80483	47µF20% 6,3V
2406	5322 126 11583	10nF 10% 50V 0603
2407	4822 122 33741	10pF 10% 50V
2408	3198 017 41050	1µF 10V 0603
2409	2238 586 59812	100nF 20-80% 50V 0603
2410	3198 017 41050	1µF 10V 0603
2411	2238 586 59812	100nF 20-80% 50V 0603
2412	4822 122 33741	10pF 10% 50V
2413	4822 124 80483	47µF20% 6,3V
2414	2238 586 59812	100nF 20-80% 50V 0603
2416	3198 017 41050	1µF 10V 0603
2417	4822 124 11947	10?F 20% 16V
2418	3198 017 41050	1µF 10V 0603
2419	3198 017 41050	1µF 10V 0603
2420	2238 586 59812	100nF 20-80% 50V 0603
2421	4822 124 11947	10?F 20% 16V
2422	5322 126 11583	10nF 10% 50V 0603
2423	3198 017 41050	1µF 10V 0603
2424	4822 124 80483	47µF20% 6,3V
2425	2238 586 59812	100nF 20-80% 50V 0603
2427	3198 017 41050	1µF 10V 0603
2428	4822 124 11947	10?F 20% 16V
2429	4822 124 11946	22µF 20% 16V
2430	2238 586 59812	100nF 20-80% 50V 0603
2432	4822 124 42234	100µF 20% 6,3V
2433	3198 017 34730	47nF 16V 0603
2434	4822 124 80483	47µF20% 6,3V
2435	2238 586 59812	100nF 20-80% 50V 0603
2436	3198 017 41050	1µF 10V 0603
2437	3198 017 41050	1µF 10V 0603
2438	3198 017 41050	1µF 10V 0603
2439	2238 586 59812	100nF 20-80% 50V 0603
2440	3198 017 41050	1µF 10V 0603
2441	3198 017 41050	1µF 10V 0603
2442	4822 124 11946	22µF 20% 16V
2443	4822 124 42234	100µF 20% 6,3V
2444	4822 126 13881	470pF 5% 50V
2445	4822 126 13881	470pF 5% 50V
2446	3198 017 41050	1µF 10V 0603
2447	4822 126 13881	470pF 5% 50V
2448	4822 126 13881	470pF 5% 50V
2450	2238 586 59812	100nF 20-80% 50V 0603
2459	3198 017 41050	1µF 10V 0603
2460	4822 124 40769	4.7µF 20% 100V
2461	4822 124 40769	4.7µF 20% 100V
2462	4822 124 11947	10?F 20% 16V
2463	4822 124 11947	10?F 20% 16V
2464	4822 124 21732	10µF 20% 25V
2501	3198 017 41050	1µF 10V 0603
2502	2238 586 59812	100nF 20-80% 50V 0603
2503	2238 586 59812	100nF 20-80% 50V 0603
2504	3198 017 41050	1µF 10V 0603
2505	3198 017 41050	1µF 10V 0603
2506	3198 017 41050	1µF 10V 0603
2507	3198 017 41050	1µF 10V 0603
2508	3198 017 41050	1µF 10V 0603
2509	2238 586 59812	100nF 20-80% 50V 0603
2510	4822 124 42234	100µF 20% 6,3V

2511	2020 009 90097	100µF BP 16V 20%
2511	2022 036 00005	10µF 16V 20%
2512	2238 586 59812	100nF 20-80% 50V 0603
2513	2020 552 96807	1µF 10V 0603 X5R
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	2020 552 96807	1µF 10V 0603 X5R
2516	2020 009 90097	100µF BP 16V 20%
2516	2022 036 00005	10µF 16V 20%
2517	5322 126 11578	1nF 10% 50V 0603
2518	2238 586 59812	100nF 20-80% 50V 0603
2519	4822 124 42234	100µF 20% 6,3V
2520	5322 126 11578	1nF 10% 50V 0603
2521	2238 586 59812	100nF 20-80% 50V 0603
2522	2020 009 90097	100µF BP 16V 20%
2522	2022 036 00005	10µF 16V 20%
2523	5322 126 11578	1nF 10% 50V 0603
2524	3198 017 41050	1µF 10V 0603
2525	3198 017 41050	1µF 10V 0603
2526	2020 009 90097	100µF BP 16V 20%
2526	2022 036 00005	10µF 16V 20%
2527	5322 126 11578	1nF 10% 50V 0603
2530	2238 586 59812	100nF 20-80% 50V 0603
2535	2238 586 59812	100nF 20-80% 50V 0603
2536	2238 586 59812	100nF 20-80% 50V 0603
2600	4822 124 21732	10µF 20% 25V
2601	5322 126 11583	10nF 10% 50V 0603
2602	4822 124 21732	10µF 20% 25V
2603	2238 586 59812	100nF 20-80% 50V 0603
2604	5322 126 11583	10nF 10% 50V 0603
2605	4822 124 21732	10µF 20% 25V
2606	2238 586 59812	100nF 20-80% 50V 0603
2607	4822 126 14225	56pF 5% 50V 0603
2608	4822 124 21732	10µF 20% 25V
2609	4822 126 14225	56pF 5% 50V 0603
2610	5322 126 11583	10nF 10% 50V 0603
2611	4822 124 80231	47µF20% 16V
2612	4822 124 40769	4.7µF 20% 100V
2616	5322 126 11578	1nF 10% 50V 0603
2617	5322 126 11578	1nF 10% 50V 0603
2620	3198 016 33380	3.3pF 50V 0603
2621	3198 016 33380	3.3pF 50V 0603
2623	2238 586 59812	100nF 20-80% 50V 0603
2713	4822 124 11946	22µF 20% 16V
2719	4822 126 13883	220pF 5% 50V
2720	4822 124 42234	100µF 20% 6,3V
2721	5322 122 33861	120pF10% 50V
2722	2022 020 00861	2.2µF 50V 20%
2722	5322 124 41379	2.2?F 20% 50V
2723	4822 126 13881	470pF 5% 50V
2724	2238 586 59812	100nF 20-80% 50V 0603
2727	2238 586 59812	100nF 20-80% 50V 0603
2728	5322 126 11583	10nF 10% 50V 0603
2729	4822 124 21732	10µF 20% 25V
2730	4822 126 13879	220nF 20% 16V
2731	2020 552 94523	8.2pF 50V 0603
2732	4822 124 22652	2.2µF 20% 50V
2733	2238 586 59812	100nF 20-80% 50V 0603
2734	5322 126 11578	1nF 10% 50V 0603
2735	4822 126 11669	27pF 5% 50V 0603
2736	4822 126 11669	27pF 5% 50V 0603
2737	4822 124 80483	47µF20% 6,3V
2740	4822 124 22652	2.2µF 20% 50V
2741	5322 126 11578	1nF 10% 50V 0603
2742	5322 126 11578	1nF 10% 50V 0603
2932	2238 586 59812	100nF 20-80% 50V 0603
2933	4822 124 80483	47µF20% 6,3V
2934	2238 586 59812	100nF 20-80% 50V 0603
2935	2238 586 59812	100nF 20-80% 50V 0603
2936	4822 122 33761	22pF 5% 50V
2937	4822 122 33761	22pF 5% 50V
2938	2238 586 59812	100nF 20-80% 50V 0603
2940	2238 586 59812	100nF 20-80% 50V 0603
2941	4822 124 21732	10µF 20% 25V
2942	4822 126 14238	2.2nF 50V 0603
2943	4822 126 14508	180pF 5% 50V
2944	4822 126 14238	2.2nF 50V 0603
2945	4822 126 14508	180pF 5% 50V
2946	3198 017 41050	1µF 10V 0603
2947	3198 017 41050	1µF 10V 0603

3001	5322 117 13031	5.6kΩ 1% 0603
3004	5322 117 13024	33kΩ 1% 0.063W 0603
3005	4822 051 30472	4.7kΩ 5% 0.062W
3006	4822 051 30472	4.7kΩ 5% 0.062W
3008	5322 117 13038	27K 1% 0.063W 0603 RC22H
3009	5322 117 13031	5.6kΩ 1% 0603
3010	5322 117 13053	6.8kΩ 1% 0.063W 0603
3011	4822 117 13632	100kΩ 1% 0603 0.62W
3012	4822 051 30103	10kΩ 5% 0.062W
3013	5322 117 13053	6.8kΩ 1% 0.063W 0603
3014	5322 117 13031	5.6kΩ 1% 0603
3015	4822 051 30471	470Ω 5% 0.062W
3016	5322 117 13038	27K 1% 0.063W 0603 RC22H
3017	5322 117 13024	33kΩ 1% 0.063W 0603
3018	5322 117 13031	5.6kΩ 1% 0603
3019	4822 116 52186	22Ω 5% 0.5W
3020	4822 051 30472	4.7kΩ 5% 0.062W
3021	4822 051 30103	10kΩ 5% 0.062W
3022	4822 117 12139	22Ω 5% 0.062W
3023	4822 117 12139	22Ω 5% 0.062W
3024	4822 117 12139	22Ω 5% 0.062W
3025	4822 117 13632	100kΩ 1% 0603 0.62W
3026	4822 117 12139	22Ω 5% 0.062W
3027	5322 117 13024	33kΩ 1% 0.063W 0603
3028	4822 117 12139	22Ω 5% 0.062W
3029	4822 051 30101	100Ω 5% 0.062W
3030	5322 117 13038	27K 1% 0.063W 0603 RC22H
3031	4822 051 30103	10kΩ 5% 0.062W
3032	5322 117 13053	6.8kΩ 1% 0.063W 0603
3033	4822 117 12139	22Ω 5% 0.062W
3034	4822 117 13613	2R2 5% 0603
3035	4822 117 13613	2R2 5% 0603
3036	5322 117 13053	6.8kΩ 1% 0.063W 0603
3039	5322 117 13038	27K 1% 0.063W 0603 RC22H
3040	5322 117 13024	33kΩ 1% 0.063W 0603
3042	4822 050 21003	10kΩ 1% 0.6W
3043	4822 117 12925	47kΩ 1% 0.063W 0603
3044	4822 117 12925	47kΩ 1% 0.063W 0603
3045	4822 051 30102	1kΩ 5% 0.062W
3047	4822 050 21003	10kΩ 1% 0.6W
3049	4822 051 30472	4.7kΩ 5% 0.062W
3051	4822 117 13632	100kΩ 1% 0603 0.62W
3052	4822 051 30223	22kΩ 5% 0.062W
3053	4822 050 21003	10kΩ 1% 0.6W
3054	4822 117 12139	22Ω 5% 0.062W
3300⚠	4822 053 21335	3.3MΩ 5% 0.5W
3301⚠	4822 053 21335	3.3MΩ 5% 0.5W
3302	4822 051 30102	1kΩ 5% 0.062W
3303	4822 051 30102	1kΩ 5% 0.062W
3304	4822 051 30103	10kΩ 5% 0.062W
3305⚠	4822 053 21684	680kΩ 5% 0,5W
3306	4822 116 83872	220Ω 5% 0.5W
3307	4822 051 30103	10kΩ 5% 0.062W
3308	4822 116 52272	330k 5% 0.5W
3309	4822 116 52272	330k 5% 0.5W
3310	4822 116 52272	330k 5% 0.5W
3311	4822 051 30102	1kΩ 5% 0.062W
3312	4822 051 30221	220Ω 5% 0.062W
3313	4822 116 52234	100kΩ 5% 0,5W
3314	4822 117 13611	1KΩ 1% 0603 ERJ3E
3314	5322 117 13018	1kΩ 1% 0.063W 0603
3315	4822 117 12902	8.2kΩ 1% 0.063W 0603
3315	5322 117 13056	8.2K 1% 0.063W 0603
3316	5322 117 13026	4.7kΩ 1% 0.063W 0603
3317	4822 051 30102	1kΩ 5% 0.062W
3318	4822 116 52175	100Ω 5% 0.5W
3321	2322 193 14477	RST MFLM PR01 A 0R47 PM5 A
3323	4822 117 12891	220kΩ 1% 0.063W 0603
3324	2322 702 60564	560kΩ 5% 0603
3325	4822 117 12925	47kΩ 1% 0.063W 0603
3326	4822 116 52195	47Ω 5% 0.5W
3327	4822 051 30105	1MΩ 5% 0.062W
3328	4822 051 30103	10kΩ 5% 0.062W
3329	3198 021 32250	2.2MΩ 5% 0603
3330	4822 051 30471	470Ω 5% 0.062W
3331	4822 051 30109	10Ω 5% 0.062W
3332	5322 117 13031	5.6kΩ 1% 0603
3333	5322 117 13026	4.7kΩ 1% 0.063W 0603
3334	4822 051 30563	56kΩ 5% 0.062W
3335	4822 051 30471	470Ω 5% 0.062W
3336	4822 051 30471	470Ω 5% 0.062W
3337	4822 051 30102	1kΩ 5% 0.062W
3338	4822 051 30221	220Ω 5% 0.062W
3339	5322 117 13026	4.7kΩ 1% 0.063W 0603
3340	5322 117 13026	4.7kΩ 1% 0.063W 0603
3341	4822 051 30683	68kΩ 5% 0.062W
3342	4822 116 52283	4.7kΩ 5% 0.5W
3343	5322 117 13026	4.7kΩ 1% 0.063W 0603
3344	4822 117 12925	47kΩ 1% 0.063W 0603
3346	4822 051 30222	2.2kΩ 5% 0.062W
3347	4822 051 30472	4.7kΩ 5% 0.062W
3348	4822 051 30681	680Ω 5% 0.062W
3349	4822 051 30479	47Ω 5% 0.062W
3350	4822 051 30102	1kΩ 5% 0.062W
3351	4822 051 30105	1MΩ 5% 0.062W
3352	2322 193 14687	RST MFLM PR01 A 0R68 PM5
3353	4822 051 30272	2.7kΩ 5% 0.062W
3354	4822 051 30272	2.7kΩ 5% 0.062W
3355	4822 051 30479	47Ω 5% 0.062W

3356	4822 116 52231	820Ω 5% 0.5W
3357	4822 051 30472	4.7kΩ 5% 0.062W
3358	4822 051 30109	10Ω 5% 0.062W
3360	4822 116 52231	820Ω 5% 0.5W
3361	4822 051 30102	1kΩ 5% 0.062W
3362	4822 051 30681	680Ω 5% 0.062W
3363	4822 051 30222	2.2kΩ 5% 0.062W
3364	4822 051 30103	10kΩ 5% 0.062W
3365	4822 051 30332	3.3kΩ 5% 0.062W
3366	4822 051 30152	1.5kΩ 5% 0.062W
3367	4822 117 12903	1.8kΩ 1% 0.063W 0603
3368	4822 051 30152	1.5kΩ 5% 0.062W
3371	4822 051 30479	47Ω 5% 0.062W
3372	4822 051 30339	33Ω 5% 0.062W
3373	4822 051 30339	33Ω 5% 0.062W
3374	4822 051 30471	470Ω 5% 0.062W
3378	4822 051 30152	1.5kΩ 5% 0.062W
3401	5322 117 13055	75R 1% 0.063W 0603
3402	5322 117 13055	75R 1% 0.063W 0603
3403	5322 117 13055	75R 1% 0.063W 0603
3404	4822 051 30759	75Ω 5% 0.062W
3405	4822 051 30223	22kΩ 5% 0.062W
3406	4822 117 12891	220kΩ 1% 0.063W 0603
3407	4822 051 30332	3.3kΩ 5% 0.062W
3408	4822 051 30392	3.9kΩ 5% 0.063W 0603
3409	5322 117 13055	75R 1% 0.063W 0603
3410	5322 117 13055	75R 1% 0.063W 0603
3411	4822 051 30759	75Ω 5% 0.062W
3412	4822 116 52201	75Ω 5% 0.5W
3413	5322 117 13055	75R 1% 0.063W 0603
3414	4822 051 30759	75Ω 5% 0.062W
3415	4822 051 30102	1kΩ 5% 0.062W
3416	4822 051 30472	4.7kΩ 5% 0.062W
3417	4822 051 30759	75Ω 5% 0.062W
3418	4822 117 13632	100kΩ 1% 0603 0.62W
3419	4822 051 30223	22kΩ 5% 0.062W
3420	4822 051 30151	150Ω 5% 0.062W
3421	4822 051 30273	27kΩ 5% 0.062W
3422	4822 116 52231	820Ω 5% 0.5W
3423	4822 051 30391	390Ω 5% 0.062W
3424	4822 051 30333	33kΩ 5% 0.062W
3425	4822 051 30471	470Ω 5% 0.062W
3426	4822 051 30333	33kΩ 5% 0.062W
3427	4822 051 30759	75Ω 5% 0.062W
3428	4822 117 13632	100kΩ 1% 0603 0.62W
3429	4822 117 12925	47kΩ 1% 0.063W 0603
3431	4822 051 30472	4.7kΩ 5% 0.062W
3432	4822 116 52175	100Ω 5% 0.5W
3433	4822 116 52175	100Ω 5% 0.5W
3434	4822 116 52283	4.7kΩ 5% 0.5W
3435	4822 116 52201	75Ω 5% 0.5W
3436	4822 116 52199	68Ω 5% 0.5W
3437	4822 051 30103	10kΩ 5% 0.062W
3438	4822 051 30103	10kΩ 5% 0.062W
3439	4822 051 30103	10kΩ 5% 0.062W
3441	4822 116 52201	75Ω 5% 0.5W
3442	4822 051 30154	150kΩ 5% 0.062W
3443	4822 117 13632	100kΩ 1% 0603 0.62W
3444	4822 117 13632	100kΩ 1% 0603 0.62W
3445	4822 051 30151	150Ω 5% 0.062W
3446	4822 117 12925	47kΩ 1% 0.063W 0603
3447	4822 116 83884	47kΩ 5% 0.5W
3448	4822 051 30271	270Ω 5% 0.062W
3449	4822 051 30151	150Ω 5% 0.062W
3450	4822 051 30271	270Ω 5% 0.062W
3451	4822 050 21003	10kΩ 1% 0.6W
3452	4822 051 30151	150Ω 5% 0.062W
3454	4822 050 11002	1kΩ 1% 0.4W
3455	4822 051 30103	10kΩ 5% 0.062W
3458	4822 117 12902	8.2kΩ 1% 0.063W 0603
3459	4822 051 30103	10kΩ 5% 0.062W
3460	4822 117 12902	8.2kΩ 1% 0.063W 0603
3461	2122 551 00031	VDR 0805 1mA/6V4 21V
3461	2322 574 10402	VDR 0805 1mA/6V4 21V
3462	2122 551 00031	VDR 0805 1mA/6V4 21V
3462	2322 574 10402	VDR 0805 1mA/6V4 21V
3463	2122 551 00031	VDR 0805 1mA/6V4 21V
3463	2322 574 10402	VDR 0805 1mA/6V4 21V
3464	2122 551 00031	VDR 0805 1mA/6V4 21V
3464	2322 574 10402	VDR 0805 1mA/6V4 21V
3465	2122 551 00031	VDR 0805 1mA/6V4 21V
3465	2322 574 10402	VDR 0805 1mA/6V4 21V
3466	2122 551 00031	VDR 0805 1mA/6V4 21V
3466	2322 574 10402	VDR 0805 1mA/6V4 21V
3467	2122 551 00031	VDR 0805 1mA/6V4 21V
3467	2322 574 10402	VDR 0805 1mA/6V4 21V
3468	2122 551 00031	VDR 0805 1mA/6V4 21V
3468	2322 574 10402	VDR 0805 1mA/6V4 21V
3469	4822 117 13632	100kΩ 1% 0603 0.62W
3470	4822 117 13632	100kΩ 1% 0603 0.62W
3471	4822 117 13632	100kΩ 1% 0603 0.62W
3472	4822 117 13632	100kΩ 1% 0603 0.62W
3475	4822 051 30101	100Ω 5% 0.062W
3476	4822 051 30101	100Ω 5% 0.062W

3477	4822 051 30101	100Ω 5% 0.062W
3478	4822 051 30101	100Ω 5% 0.062W
3487	4822 117 13632	100kΩ 1% 0603 0.62W
3488	4822 117 13632	100kΩ 1% 0603 0.62W
3489	4822 117 12864	82kΩ 5% 0.6W
3490	4822 051 30151	150Ω 5% 0.062W
3491	4822 051 30151	150Ω 5% 0.062W
3492	4822 051 30151	150Ω 5% 0.062W
3493	4822 051 30151	150Ω 5% 0.062W
3494	4822 051 30151	150Ω 5% 0.062W
3495	4822 051 30471	470Ω 5% 0.062W
3496	4822 051 30471	470Ω 5% 0.062W
3501	4822 051 30102	1kΩ 5% 0.062W
3502	4822 050 11002	1kΩ 1% 0.4W
3503	4822 117 13632	100kΩ 1% 0603 0.62W
3504	4822 117 13632	100kΩ 1% 0603 0.62W
3505	4822 117 13632	100kΩ 1% 0603 0.62W
3506	4822 117 13632	100kΩ 1% 0603 0.62W
3507	4822 117 13632	100kΩ 1% 0603 0.62W
3508	4822 051 30102	1kΩ 5% 0.062W
3509	4822 050 11002	1kΩ 1% 0.4W
3510	4822 117 13632	100kΩ 1% 0603 0.62W
3511	4822 117 13632	100kΩ 1% 0603 0.62W
3512	4822 051 30102	1kΩ 5% 0.062W
3513	4822 051 30102	1kΩ 5% 0.062W
3514	4822 117 13632	100kΩ 1% 0603 0.62W
3515	4822 050 11002	1kΩ 1% 0.4W
3516	4822 117 13632	100kΩ 1% 0603 0.62W
3517	4822 116 52283	4.7kΩ 5% 0.5W
3518	4822 051 30102	1kΩ 5% 0.062W
3519	4822 116 52283	4.7kΩ 5% 0.5W
3520	4822 051 30221	220Ω 5% 0.062W
3521	4822 051 30221	220Ω 5% 0.062W
3522	4822 051 30221	220Ω 5% 0.062W
3523	4822 050 11002	1kΩ 1% 0.4W
3524	4822 117 12968	820Ω 5% 0.62W
3525	4822 051 30221	220Ω 5% 0.062W
3526	4822 051 30102	1kΩ 5% 0.062W
3527	4822 117 12968	820Ω 5% 0.62W
3528	4822 051 30472	4.7kΩ 5% 0.062W
3529	4822 051 30472	4.7kΩ 5% 0.062W
3530	4822 117 12968	820Ω 5% 0.62W
3531	4822 117 12968	820Ω 5% 0.62W
3532	4822 050 11002	1kΩ 1% 0.4W
3533	4822 050 11002	1kΩ 1% 0.4W
3534	4822 117 13632	100kΩ 1% 0603 0.62W
3600	4822 051 30103	10kΩ 5% 0.062W
3601	4822 116 52175	100Ω 5% 0.5W
3602	4822 051 30472	4.7kΩ 5% 0.062W
3603	4822 116 52175	100Ω 5% 0.5W
3611	4822 051 30101	100Ω 5% 0.062W
3612	4822 051 30101	100Ω 5% 0.062W
3701	4822 116 52228	680Ω 5% 0.5W
3702	4822 051 30471	470Ω 5% 0.062W
3703	4822 116 52245	150kΩ 5% 0.5W
3704	4822 051 30221	220Ω 5% 0.062W
3705	4822 051 30103	10kΩ 5% 0.062W
3710	4822 051 30562	5.6kΩ 5% 0.063W 0603
3711	4822 051 30333	33kΩ 5% 0.062W
3714	4822 051 30183	18kΩ 5% 0.062W
3715	4822 051 30103	10kΩ 5% 0.062W
3716	4822 051 30472	4.7kΩ 5% 0.062W
3717	4822 051 30472	4.7kΩ 5% 0.062W
3720	4822 051 30331	330Ω 5% 0.062W
3724	4822 100 12158	22K 30%
3725	4822 117 12902	8.2kΩ 1% 0.063W 0603
3726	4822 051 30101	100Ω 5% 0.062W
3728	4822 051 30101	100Ω 5% 0.062W
3730	4822 051 30472	4.7kΩ 5% 0.062W
3731	4822 051 30271	270Ω 5% 0.062W
3732	4822 051 30102	1kΩ 5% 0.062W
3733	4822 051 30472	4.7kΩ 5% 0.062W
3734	4822 051 30272	2.7kΩ 5% 0.062W
3735	4822 051 30332	3.3kΩ 5% 0.062W
3736	4822 051 30331	330Ω 5% 0.062W
3737	4822 051 30222	2.2kΩ 5% 0.062W
3738	4822 051 30682	6.8kΩ 5% 0.062W
3739	4822 051 30562	5.6kΩ 5% 0.063W 0603
3740	4822 051 30681	680Ω 5% 0.062W
3741	4822 051 30472	4.7kΩ 5% 0.062W
3742	4822 051 30472	4.7kΩ 5% 0.062W
3743	4822 051 30563	56kΩ 5% 0.062W
3744	4822 117 13632	100kΩ 1% 0603 0.62W
3745	4822 051 30562	5.6kΩ 5% 0.063W 0603
3746	4822 051 30562	5.6kΩ 5% 0.063W 0603
3758	4822 051 30103	10kΩ 5% 0.062W
3931	4822 117 12925	47kΩ 1% 0.063W 0603
3932	4822 117 12925	47kΩ 1% 0.063W 0603
3933	4822 117 12925	47kΩ 1% 0.063W 0603
3934	4822 051 30101	100Ω 5% 0.062W
3935	4822 051 30101	100Ω 5% 0.062W
3936	4822 051 30103	10kΩ 5% 0.062W
3937	4822 051 30222	2.2kΩ 5% 0.062W
3938	4822 051 30222	2.2kΩ 5% 0.062W

3939	4822 051 30472	4.7kΩ 5% 0.062W
3940	3198 021 31060	10MΩ 5% 0.062W 0603
3941	3198 021 31060	10MΩ 5% 0.062W 0603
3942	4822 051 30333	33kΩ 5% 0.062W
3943	4822 051 30333	33kΩ 5% 0.062W
3944	4822 051 30333	33kΩ 5% 0.062W
3945	4822 051 30333	33kΩ 5% 0.062W
3946	4822 051 30333	33kΩ 5% 0.062W
3947	4822 051 30333	33kΩ 5% 0.062W
3948	4822 051 30472	4.7kΩ 5% 0.062W
3950	4822 117 13632	100kΩ 1% 0603 0.62W
3951	4822 051 30223	22kΩ 5% 0.062W
3952	4822 051 30153	15kΩ 5% 0.062W
3953	4822 051 30472	4.7kΩ 5% 0.062W
3954	4822 051 30472	4.7kΩ 5% 0.062W
3955	4822 051 30103	10kΩ 5% 0.062W
4001	4822 051 30008	Jumper 0603
4002	4822 051 30008	Jumper 0603
4003	4822 051 30008	Jumper 0603
4402	4822 051 30008	Jumper 0603
4411	4822 051 30008	Jumper 0603
4412	4822 051 30008	Jumper 0603
4413	4822 051 30008	Jumper 0603
4414	4822 051 30008	Jumper 0603
4415	4822 051 30008	Jumper 0603
4416	4822 051 30008	Jumper 0603
4417	4822 051 30008	Jumper 0603
4418	4822 051 30008	Jumper 0603
4419	4822 051 30008	Jumper 0603
4420	4822 051 30008	Jumper 0603
4421	4822 051 30008	Jumper 0603
4422	4822 051 30008	Jumper 0603
4423	4822 051 30008	Jumper 0603
4424	4822 051 30008	Jumper 0603
4425	4822 051 30008	Jumper 0603
4426	4822 051 30008	Jumper 0603
4428	4822 051 30008	Jumper 0603
4429	4822 051 30008	Jumper 0603
4430	4822 051 30008	Jumper 0603
4431	4822 051 30008	Jumper 0603
4433	4822 051 30008	Jumper 0603
4434	4822 051 30008	Jumper 0603
4435	4822 051 30008	Jumper 0603
4437	4822 051 30008	Jumper 0603
4442	4822 051 30008	Jumper 0603
4443	4822 051 30008	Jumper 0603
4444	4822 051 30008	Jumper 0603
4446	4822 051 30008	Jumper 0603
4447	4822 051 30008	Jumper 0603
4448	4822 051 30008	Jumper 0603
4449	4822 051 30008	Jumper 0603
4452	4822 051 30008	Jumper 0603
4453	4822 051 30008	Jumper 0603
4454	4822 051 30008	Jumper 0603
4455	4822 051 30008	Jumper 0603
4459	4822 051 30008	Jumper 0603
4460	4822 051 10008	Jumper 1206
4461	4822 051 30008	Jumper 0603
4601	4822 051 30008	Jumper 0603
4999	4822 051 30008	Jumper 0603

5001	2422 549 43062	Bead 600Ω at 100MHz
5002	2422 549 43062	Bead 600Ω at 100MHz
5300⚠	2422 531 02546	TFM SMT SLOT SRW28EC9-E01V0* B
5300⚠	3128 138 40782	CT286D8 B
5301	4822 157 51195	1 UH 20% 4X9,8MM
5302⚠	2422 549 44509	FIL MAINS 25MH 0A4 HF2022R Y
5304	4822 157 70826	2.4µH
5305	4822 157 70826	2.4µH
5306	2422 535 94634	2.2µH LHL08 20%
5307	4822 157 11737	22µH 10%
5308	4822 157 11737	22µH 10%
5309	4822 157 11737	22µH 10%
5401	4822 157 11706	10µH 5%
5402	4822 157 11706	10µH 5%
5403	4822 157 11706	10µH 5%
5404	4822 157 11706	10µH 5%
5405	2422 549 43062	Bead 600Ω at 100MHz
5406	4822 157 11706	10µH 5%
5407	2422 549 43062	Bead 600Ω at 100MHz
5600⚠	4822 157 11706	10µH 5%
5601⚠	4822 157 11706	10µH 5%
5602⚠	4822 157 11706	10µH 5%
5701	2422 549 43062	Bead 600Ω at 100MHz
5702	2422 549 43062	Bead 600Ω at 100MHz
5705	4822 157 11139	6.8µH 5%
5709	4822 157 11139	6.8µH 5%
5710	2422 549 44162	IND VAR 7MM 7KMY 77M8

5711	2422 549 45833	IND VAR 7MM 7KLY 77MHZ8
5713	4822 157 11747	15UH 5%
5714	4822 157 11747	15UH 5%
5931	4822 157 11706	10µH 5%
5932	2422 549 43062	Bead 600Ω at 100MHz

→|—

6003	4822 130 30621	1N4148
6004	4822 130 30621	1N4148
6005	4822 130 11397	BAS316
6300	9322 161 76682	SB340L-7024
6301	4822 130 31603	1N4006
6302	4822 130 31603	1N4006
6303	9322 161 76682	SB340L-7024
6305	4822 130 31603	1N4006
6306	4822 130 31603	1N4006
6307	4822 130 82627	SB540
6307	9322 161 77682	SB540L-7024
6307	9322 184 68682	STPS5L40-C2
6308	4822 130 82627	SB540
6308	9322 161 77682	SB540L-7024
6308	9322 184 68682	STPS5L40-C2
6309	9322 126 71673	BYT42M
6310	9322 161 78682	SB360L-7024
6310	9322 188 34682	STPS3L60-C2
6311	4822 130 31878	1N4003G
6312	4822 130 11416	PDZ6.8B
6313	4822 130 10871	SBYV27-200
6313	9322 199 50673	UF202G
6314	4822 130 10837	UDZS8.2B
6315	4822 130 11397	BAS316
6316	4822 130 30842	BAV21
6317	4822 130 42488	BYD33D
6317	9322 126 71673	BYT42M
6317	9322 196 45673	PG102R
6318	3198 010 53390	BZX79-B33
6319	4822 130 42488	BYD33D
6319	9322 126 71673	BYT42M
6319	9322 196 45673	PG102R
6320	4822 130 11397	BAS316
6321	4822 130 10654	BAT254
6322	4822 130 11416	PDZ6.8B
6324	9340 548 69115	PDZ27B
6325	4822 130 81234	1N5819
6401	9340 548 61115	PDZ12B
6402	9340 548 61115	PDZ12B
6403	9340 548 61115	PDZ12B
6404	9340 548 61115	PDZ12B
6409	4822 130 11416	PDZ6.8B
6414	4822 130 11416	PDZ6.8B
6415	9340 548 61115	PDZ12B
6416	9340 548 61115	PDZ12B
6417	9340 548 61115	PDZ12B
6418	9340 548 61115	PDZ12B
6419	9340 548 61115	PDZ12B
6420	9340 548 61115	PDZ12B
6422	4822 130 11564	UDZ3.9B
6423	9340 548 61115	PDZ12B
6424	9340 548 61115	PDZ12B
6425	9340 548 61115	PDZ12B
6426	9340 548 61115	PDZ12B
6427	9340 548 61115	PDZ12B
6428	9340 548 61115	PDZ12B
6429	9340 548 61115	PDZ12B
6600	4822 130 11397	BAS316
6703	9340 552 30115	BA591
6704	9340 552 30115	BA591
6705	9340 552 30115	BA591

7001	4822 130 60854	DTA124EU-W
7003	4822 209 62312	MC33078D
7004	9322 148 78668	IC SM AD1852JRS (ANA0) R
7005	3198 010 42310	BC847BW
7006	3198 010 42310	BC847BW
7007	9352 670 99118	UDA1361TS/N1
7008	3198 010 42320	BC857BW
7009	3198 010 42320	BC857BW
7010	4822 130 61553	DTC124EU
7301	4822 209 14933	TL431IZ
7302	4822 130 11336	STP16NE06FP
7303	9322 160 70668	SI4936ADY
7303	9322 183 38668	STS9NF30L
7304	4822 209 14933	TL431IZ
7305	4822 209 14933	TL431IZ
7306	4822 130 61553	DTC124EU
7307	9322 157 37687	STP3NC60FP
7308	4822 130 61553	DTC124EU
7309	9322 180 12685	SI2312DS
7310	3198 010 42310	BC847BW
7311	3198 010 42310	BC847BW
7312	4822 130 41782	BF422
7313	9352 673 56112	TEA1507P/N1
7314⚠	9322 153 43682	LTV817BM-V
7314⚠	9965 000 09548	TCET1108G
7315	4822 209 14933	TL431IZ
7317	9322 191 71687	STD17NF03L-1
7318	9322 163 75685	SI2306DS
7319	5322 130 60159	BC846B
7320	9322 163 75685	SI2306DS
7321	4822 130 61553	DTC124EU
7322	3198 010 42320	BC857BW
7401	3198 010 42320	BC857BW
7402	3198 010 42310	BC847BW
7403	3198 010 42320	BC857BW
7404	3198 010 42320	BC857BW
7405	3198 010 42310	BC847BW
7406	3198 010 42320	BC857BW
7407	3198 010 42310	BC847BW
7408	9322 173 41668	ST6618
7409	3198 010 42310	BC847BW
7410	9322 174 76668	NJM2267M
7411	9322 179 71668	NJM2285M
7412	4822 130 61553	DTC124EU
7415	9340 219 30115	BC817-25W
7416	9340 219 30115	BC817-25W
7421	3198 010 42310	BC847BW
7501	5322 209 11102	HEF4052BT
7502	4822 209 32071	MC33079D
7503	5322 209 11102	HEF4052BT
7504	5322 209 11102	HEF4052BT
7505	4822 209 62312	MC33078D
7506	9340 219 30115	BC817-25W
7508	9340 219 30115	BC817-25W
7509	9340 219 30115	BC817-25W
7511	9340 219 30115	BC817-25W
7600	9322 186 87668	MSP3415G-QG-B8V3
7701	4822 130 61553	DTC124EU
7702	4822 130 61553	DTC124EU
7704	4822 130 61553	DTC124EU
7705	4822 130 61553	DTC124EU
7706	4822 130 61553	DTC124EU
7710	9352 606 11118	TDA9818T/V1
7711	3198 010 42320	BC857BW
7712	4822 130 61553	DTC124EU
7713	3198 010 42320	BC857BW
7714	3198 010 42310	BC847BW
7716	3198 010 42320	BC857BW
7717	3198 010 42310	BC847BW
7931	4822 209 17505	STV5348D
7932	3198 010 42310	BC847BW
7933	3198 010 42310	BC847BW
7934	4822 209 60177	LM339D

Up Sub Board

Various

1801	2422 543 01115	24.576MHz 12P QS06
1805	4822 242 70938	TA252E00 (32,768KHZ)
1901	2422 025 12488	CON BM H 2P M 2.50 EH B
1980	2422 025 17723	CON BM V 8P M2.00 C36 B
1980	2422 025 18217	CON V 8P M 2.00
1984	2422 025 17723	CON BM V 8P M2.00 C36 B
1984	2422 025 18217	CON V 8P M 2.00
1986	2422 025 16677	Connector 10P
1987	2422 025 17723	CON BM V 8P M2.00 C36 B
1987	2422 025 18217	CON V 8P M 2.00
1988	2422 025 17723	CON BM V 8P M2.00 C36 B
1988	2422 025 18217	CON V 8P M 2.00

⊣⊢

2800	2238 586 59812	100nF 20-80% 50V 0603
2801	4822 122 33752	15pF 5% 50V
2802	4822 122 33752	15pF 5% 50V
2803	2238 586 59812	100nF 20-80% 50V 0603
2804	2238 586 59812	100nF 20-80% 50V 0603
2805	2238 586 59812	100nF 20-80% 50V 0603
2806	2238 586 59812	100nF 20-80% 50V 0603
2807	4822 126 13879	220nF 20% 16V
2808	2238 586 59812	100nF 20-80% 50V 0603
2809	2238 586 59812	100nF 20-80% 50V 0603
2810	4822 122 33741	10pF 10% 50V
2811	4822 122 33741	10pF 10% 50V
2812	5322 126 11583	10nF 10% 50V 0603
2813	4822 122 33741	10pF 10% 50V
2814	4822 122 33741	10pF 10% 50V
2815	4822 126 13883	220pF 5% 50V
2816	4822 124 11968	220mF +80-20% 5,5V
2817	2238 586 59812	100nF 20-80% 50V 0603
2818	4822 126 13883	220pF 5% 50V
2819	4822 124 42234	100µF 20% 6,3V
2820	5322 126 11583	10nF 10% 50V 0603
2821	5322 126 11583	10nF 10% 50V 0603
2822	2238 586 59812	100nF 20-80% 50V 0603
2823	5322 126 11578	1nF 10% 50V 0603
2824	3198 017 41050	1µF 10V 0603
2825	2020 552 94427	100pF 5% 50v 0603
2828	2238 586 59812	100nF 20-80% 50V 0603
2829	4822 124 21732	10µF 20% 25V
2830	2238 586 59812	100nF 20-80% 50V 0603
2831	5322 126 11583	10nF 10% 50V 0603
2833	2238 586 59812	100nF 20-80% 50V 0603
2912	4822 124 23052	100UF20% 16V
2913	4822 124 23052	100UF20% 16V

-ww-

3800	4822 051 30101	100Ω 5% 0.062W
3801	4822 051 30103	10kΩ 5% 0.062W
3802	4822 051 30101	100Ω 5% 0.062W
3803	4822 051 30102	1kΩ 5% 0.062W
3804	4822 051 30103	10kΩ 5% 0.062W
3805	4822 051 30101	100Ω 5% 0.062W
3806	4822 051 30223	22kΩ 5% 0.062W
3807	4822 117 13632	100kΩ 1% 0603 0.62W
3808	4822 117 13632	100kΩ 1% 0603 0.62W
3809	4822 117 13632	100kΩ 1% 0603 0.62W
3810	4822 117 13632	100kΩ 1% 0603 0.62W
3811	4822 051 30101	100Ω 5% 0.062W
3812	4822 051 30223	22kΩ 5% 0.062W
3813	4822 051 30103	10kΩ 5% 0.062W
3814	4822 051 30103	10kΩ 5% 0.062W
3815	4822 051 30183	18kΩ 5% 0.062W
3816	4822 051 30103	10kΩ 5% 0.062W
3817	4822 051 30222	2.2kΩ 5% 0.062W
3818	4822 051 30472	4.7kΩ 5% 0.062W
3819	4822 051 30103	10kΩ 5% 0.062W
3820	4822 051 30102	1kΩ 5% 0.062W
3821	4822 051 30103	10kΩ 5% 0.062W
3822	4822 051 30103	10kΩ 5% 0.062W
3823	4822 117 13632	100kΩ 1% 0603 0.62W
3824	4822 051 30102	1kΩ 5% 0.062W
3825	4822 051 30103	10kΩ 5% 0.062W
3826	4822 051 30102	1kΩ 5% 0.062W
3827	4822 051 30102	1kΩ 5% 0.062W
3828	4822 051 30103	10kΩ 5% 0.062W
3829	4822 051 30103	10kΩ 5% 0.062W
3830	4822 051 30102	1kΩ 5% 0.062W
3831	4822 051 30102	1kΩ 5% 0.062W
3832	4822 051 30333	33kΩ 5% 0.062W
3833	4822 051 30102	1kΩ 5% 0.062W
3834	4822 051 30102	1kΩ 5% 0.062W
3835	4822 051 30102	1kΩ 5% 0.062W
3836	4822 051 30101	100Ω 5% 0.062W
3837	4822 051 30123	12kΩ 5% 0.062W
3838	4822 051 30102	1kΩ 5% 0.062W
3839	4822 051 30273	27kΩ 5% 0.062W
3840	4822 051 30472	4.7kΩ 5% 0.062W
3841	4822 117 13632	100kΩ 1% 0603 0.62W
3842	4822 117 12891	220kΩ 1% 0.063W 0603
3843	4822 051 30333	33kΩ 5% 0.062W
3844	4822 051 30221	220Ω 5% 0.062W
3845	4822 051 30102	1kΩ 5% 0.062W
3846	4822 051 30333	33kΩ 5% 0.062W
3847	4822 051 30103	10kΩ 5% 0.062W
3849	4822 117 12925	47kΩ 1% 0.063W 0603
3850	4822 051 30183	18kΩ 5% 0.062W
3851	4822 051 30103	10kΩ 5% 0.062W
3852	4822 051 30103	10kΩ 5% 0.062W
3854	4822 051 30102	1kΩ 5% 0.062W
3855	4822 051 30471	470Ω 5% 0.062W
3856	4822 051 30103	10kΩ 5% 0.062W
3857	4822 051 30103	10kΩ 5% 0.062W
3858	4822 117 13632	100kΩ 1% 0603 0.62W
3860	4822 051 30222	2.2kΩ 5% 0.062W
3861	3198 021 32250	2.2MΩ 5% 0603
3862	4822 051 30103	10kΩ 5% 0.062W
3863	4822 117 13608	4.7Ω 5% 0603 0.62W
3864	4822 117 13608	4.7Ω 5% 0603 0.62W
3865	4822 117 13608	4.7Ω 5% 0603 0.62W
3866	4822 117 13608	4.7Ω 5% 0603 0.62W
3867	4822 051 30759	75Ω 5% 0.062W
3868	4822 051 30103	10kΩ 5% 0.062W
3869	4822 051 30331	330Ω 5% 0.062W
3870	4822 117 13632	100kΩ 1% 0603 0.62W
3871	4822 051 30103	10kΩ 5% 0.062W
3872	4822 051 30103	10kΩ 5% 0.062W
3873	4822 051 30472	4.7kΩ 5% 0.062W
3874	4822 051 30103	10kΩ 5% 0.062W
3875	4822 051 30103	10kΩ 5% 0.062W
3876	4822 051 30103	10kΩ 5% 0.062W

3878	4822 051 30102	1kΩ 5% 0.062W
3879	4822 051 30102	1kΩ 5% 0.062W
3881	4822 117 12925	47kΩ 1% 0.063W 0603
3882	4822 117 12925	47kΩ 1% 0.063W 0603
3884	4822 051 30101	100Ω 5% 0.062W
3885	4822 051 30101	100Ω 5% 0.062W
3886	4822 051 30472	4.7kΩ 5% 0.062W
3887	4822 051 30472	4.7kΩ 5% 0.062W
3888	4822 051 30471	470Ω 5% 0.062W
3889	4822 051 30183	18kΩ 5% 0.062W
3913	4822 051 30102	1kΩ 5% 0.062W
3914	4822 051 30102	1kΩ 5% 0.062W
3915	4822 051 30102	1kΩ 5% 0.062W
3916	4822 051 30273	27kΩ 5% 0.062W
3917	2322 704 63603	36kΩ 0603 RC22H 1%
3918	4822 051 30102	1kΩ 5% 0.062W
3919	5322 117 13024	33kΩ 1% 0.063W 0603
3920	4822 051 30562	5.6kΩ 5% 0.063W 0603
3921	4822 051 30471	470Ω 5% 0.062W
3922	4822 051 30102	1kΩ 5% 0.062W
3923	4822 051 30103	10kΩ 5% 0.062W
3924	4822 051 30103	10kΩ 5% 0.062W
3925	4822 117 12706	10kΩ 1% 0.063W 0603
3926	4822 051 30472	4.7kΩ 5% 0.062W
3927	4822 051 30333	33kΩ 5% 0.062W
3929	4822 051 30008	Jumper 0603
3931	4822 051 30008	Jumper 0603
3933	4822 051 30008	Jumper 0603
4901	4822 051 30008	Jumper 0603
4904	4822 051 10008	Jumper 1206

⌇

5801	2422 549 44607	Bead 600Ω at 100MHz
5802	2422 549 44607	Bead 600Ω at 100MHz
5803	2422 549 44607	Bead 600Ω at 100MHz
5804	2422 549 44607	Bead 600Ω at 100MHz

⊳|

6800	4822 130 11397	BAS316
6801	4822 130 11564	UDZ3.9B
6802	4822 130 10654	BAT254
6803	4822 130 10654	BAT254
6804	4822 130 10654	BAT254
6805	4822 130 10654	BAT254
6901	5322 130 34331	BAV70
6903	5322 130 34331	BAV70

⊗▭

7801	9352 190 00118	74LVC573AD
7802	4822 130 61553	DTC124EU
7803	9322 186 16668	CY62128VLL-70SC
7804	3103 165 13721	TMP91CW12AF/LIRP1
7805	9965 000 17112	M29W800-AN1300XX
7806	9322 163 26685	NCP301LSN30
7807	4822 209 73852	PMBT2369
7808	4822 209 16907	M24C16-MN6T
7810	9352 686 35118	PCA9515DP
7811	4822 130 61553	DTC124EU
7813	3198 010 42310	BC847BW
7814	3198 010 42310	BC847BW
7815	3198 010 42310	BC847BW
7816	3198 010 42310	BC847BW
7817	3198 010 42310	BC847BW
7818	4822 130 60854	DTA124EU-W
7821	9340 560 36235	BSH111
7822	9340 560 36235	BSH111
7825	9322 181 92682	LA7213
7902	4822 209 63709	LM324D
7903	4822 130 61553	DTC124EU
7904	4822 130 60854	DTA124EU-W
7905	4822 130 61553	DTC124EU
7906	4822 130 61553	DTC124EU
7907	4822 130 61553	DTC124EU
7908	4822 130 61553	DTC124EU
7909	4822 130 41087	BC638
7910	4822 130 61553	DTC124EU

In Out Extension Board

Various

1920	2422 025 17897	CON H 6P F 1.00 FFC 0.3
1921	2422 025 16924	CON H 7P
1922	2422 026 05374	SOC CINCH H 3P F 3L1
1925	4822 267 31729	CONNECTOR

⊣⊢

2250	3198 017 41050	1µF 10V 0603
2254	4822 122 33753	150pF 5% 50V
2255	2238 586 59812	100nF 20-80% 50V 0603
2256	2238 586 59812	100nF 20-80% 50V 0603
2257	5322 126 11578	1nF 10% 50V 0603
2258	2238 586 59812	100nF 20-80% 50V 0603
2259	2222 867 15339	33pF 5% 50V 0603
2260	2238 586 59812	100nF 20-80% 50V 0603
2261	4822 124 42234	100µF 20% 6,3V
2265	5322 126 11583	10nF 10% 50V 0603
2266	2238 586 59812	100nF 20-80% 50V 0603

-WW-

3250	4822 116 52219	330Ω 5% 0.5W
3252	4822 051 30101	100Ω 5% 0.062W
3255	4822 117 13632	100kΩ 1% 0603 0.62W
3259	4822 116 52201	75Ω 5% 0.5W
3260	4822 051 30222	2.2kΩ 5% 0.062W
3261	4822 051 30471	470Ω 5% 0.062W
3262	4822 051 30561	560Ω 5% 0.062W
3263	4822 116 52195	47Ω 5% 0.5W
3264	4822 051 30101	100Ω 5% 0.062W
4001	4822 051 30008	Jumper 0603
4201	4822 051 30008	Jumper 0603

⌇

5250	2422 536 00019	TRANSFORMER 6RG
5251	2422 549 43062	Bead 600Ω at 100MHz
5255	2422 549 43062	Bead 600Ω at 100MHz

⊳|

6255	9322 175 41687	SOC OPT JFJ1000-010010
6256	9322 146 61685	DF3A6.8FU
6257	9322 146 61685	DF3A6.8FU
6258	9322 146 61685	DF3A6.8FU

⊗▭

7250	5322 209 11517	PC74HCU04T

Digital Board

Various

1001	2422 543 89017	24M576 18P CX-11F
1102	2422 025 18185	CON V 40P M 2.54
1103	2422 025 17104	Connector 7p m
1104	2422 025 16729	Connector FFC 10p m
1201	2422 543 01115	24.576MHz 12P QS06
1203	2422 025 17955	CON V 6P M 1.00 SM SR
1400	8203 107 92221	CON BM V 28P SMD 1.27
1500	2422 025 17441	CON BM V 12P M 2.00 PH
1505⚠	2422 086 11087	FUSE F 1A 125V
1506⚠	2422 086 11087	FUSE F 1A 125V
1507⚠	2422 086 11087	FUSE F 1A 125V
1704	2422 025 16794	CON BM V 7P F 1.00 FFC
1900	2422 025 16389	CON BM V 22P F 1.00 FFC
1901	2422 025 16987	CON V 6P F 1.00 SM FFC
1904	2422 025 16389	CON BM V 22P F 1.00 FFC

⊣⊢

2014	4822 124 80151	47µF 20% 16V
2015	2238 586 59812	100nF 20-80% 50V 0603
2016	2238 586 59812	100nF 20-80% 50V 0603
2017	2238 586 59812	100nF 20-80% 50V 0603
2018	2238 586 59812	100nF 20-80% 50V 0603
2019	2238 586 59812	100nF 20-80% 50V 0603
2020	2238 586 59812	100nF 20-80% 50V 0603
2021	2238 586 59812	100nF 20-80% 50V 0603
2022	2020 021 91729	4.7µF 20% 35V
2026	2238 586 59812	100nF 20-80% 50V 0603
2027	2238 586 59812	100nF 20-80% 50V 0603
2028	2238 586 59812	100nF 20-80% 50V 0603
2029	2238 586 59812	100nF 20-80% 50V 0603
2030	2238 586 59812	100nF 20-80% 50V 0603
2031	2238 586 59812	100nF 20-80% 50V 0603
2032	2238 586 59812	100nF 20-80% 50V 0603
2033	2020 021 91729	4.7µF 20% 35V
2035	2238 586 59812	100nF 20-80% 50V 0603
2036	4822 126 14506	270pF 5% 50V 0603
2037	2238 586 59812	100nF 20-80% 50V 0603
2038	2238 586 59812	100nF 20-80% 50V 0603
2039	2238 586 59812	100nF 20-80% 50V 0603
2040	2238 586 59812	100nF 20-80% 50V 0603
2041	2238 586 59812	100nF 20-80% 50V 0603
2042	2238 586 59812	100nF 20-80% 50V 0603
2043	2238 586 59812	100nF 20-80% 50V 0603
2044	2020 021 91729	4.7µF 20% 35V
2046	4822 122 33761	22pF 5% 50V
2048	4822 122 33753	150pF 5% 50V
2049	2020 021 91729	4.7µF 20% 35V
2050	2238 586 59812	100nF 20-80% 50V 0603
2052	2238 586 59812	100nF 20-80% 50V 0603
2053	2238 586 59812	100nF 20-80% 50V 0603
2054	2238 586 59812	100nF 20-80% 50V 0603
2056	2238 586 59812	100nF 20-80% 50V 0603
2058	2238 586 59812	100nF 20-80% 50V 0603
2059	4822 126 14507	18pF 5% 50V 0603
2060	4822 126 14507	18pF 5% 50V 0603
2061	2238 586 59812	100nF 20-80% 50V 0603
2063	2238 586 59812	100nF 20-80% 50V 0603
2064	2238 586 59812	100nF 20-80% 50V 0603
2065	2238 586 59812	100nF 20-80% 50V 0603
2066	3198 016 31020	1nF 10% 25V 0603
2067	2238 586 59812	100nF 20-80% 50V 0603
2071	2238 586 59812	100nF 20-80% 50V 0603
2101	2238 916 15641	22nF 10% 25V 0603
2103	2238 586 59812	100nF 20-80% 50V 0603
2108	4822 126 14585	100nF 10% 50V
2112	4822 126 14247	1.5nF 50V 0603
2113	4822 126 13881	470pF 5% 50V
2116	2238 586 59812	100nF 20-80% 50V 0603
2119	4822 126 14247	1.5nF 50V 0603
2120	2238 586 59812	100nF 20-80% 50V 0603
2125	2238 586 59812	100nF 20-80% 50V 0603
2200	3198 017 41050	1µF 10V 0603
2201	4822 126 14506	270pF 5% 50V 0603
2202	4822 126 11663	12pF 5% 50V 0603
2203	4822 126 11663	12pF 5% 50V 0603
2206	2238 586 59812	100nF 20-80% 50V 0603
2207	2238 586 59812	100nF 20-80% 50V 0603
2209	2238 586 59812	100nF 20-80% 50V 0603
2210	2238 586 59812	100nF 20-80% 50V 0603
2212	4822 124 12095	100µF 20% 16V
2214	2238 586 59812	100nF 20-80% 50V 0603
2215	2238 586 59812	100nF 20-80% 50V 0603
2217	2238 586 59812	100nF 20-80% 50V 0603
2218	2238 586 59812	100nF 20-80% 50V 0603
2219	2238 586 59812	100nF 20-80% 50V 0603
2220	2238 586 59812	100nF 20-80% 50V 0603
2221	2238 586 59812	100nF 20-80% 50V 0603
2222	2238 586 59812	100nF 20-80% 50V 0603
2223	2238 586 59812	100nF 20-80% 50V 0603
2224	2238 586 59812	100nF 20-80% 50V 0603
2225	2238 586 59812	100nF 20-80% 50V 0603
2226	2238 586 59812	100nF 20-80% 50V 0603
2227	2238 586 59812	100nF 20-80% 50V 0603
2228	2238 586 59812	100nF 20-80% 50V 0603
2229	2238 586 59812	100nF 20-80% 50V 0603
2230	2238 586 59812	100nF 20-80% 50V 0603
2231	2238 586 59812	100nF 20-80% 50V 0603
2232	2238 586 59812	100nF 20-80% 50V 0603
2233	2238 586 59812	100nF 20-80% 50V 0603
2234	2238 586 59812	100nF 20-80% 50V 0603
2235	3198 016 31020	1nF 10% 25V 0603
2236	2020 021 91729	4.7µF 20% 35V
2237	2238 586 59812	100nF 20-80% 50V 0603
2238	2238 586 59812	100nF 20-80% 50V 0603
2308	2238 586 59812	100nF 20-80% 50V 0603
2310	2238 586 59812	100nF 20-80% 50V 0603
2403	2238 586 59812	100nF 20-80% 50V 0603
2404	4822 124 23002	10µF 20% 16V
2405	2238 586 59812	100nF 20-80% 50V 0603
2406	2238 586 59812	100nF 20-80% 50V 0603
2407	2238 586 59812	100nF 20-80% 50V 0603
2408	4822 124 23002	10µF 20% 16V
2409	2238 586 59812	100nF 20-80% 50V 0603
2410	2238 586 59812	100nF 20-80% 50V 0603
2411	2238 586 59812	100nF 20-80% 50V 0603
2412	2238 586 59812	100nF 20-80% 50V 0603
2413	2238 586 59812	100nF 20-80% 50V 0603
2414	2238 586 59812	100nF 20-80% 50V 0603
2415	2238 586 59812	100nF 20-80% 50V 0603
2416	2238 586 59812	100nF 20-80% 50V 0603
2417	2238 586 59812	100nF 20-80% 50V 0603
2418	4822 124 23002	10µF 20% 16V
2419	2238 586 59812	100nF 20-80% 50V 0603
2420	4822 124 23002	10µF 20% 16V
2421	2238 586 59812	100nF 20-80% 50V 0603
2422	2238 586 59812	100nF 20-80% 50V 0603
2423	2238 586 59812	100nF 20-80% 50V 0603
2424	2238 586 59812	100nF 20-80% 50V 0603
2425	2238 586 59812	100nF 20-80% 50V 0603
2426	2238 586 59812	100nF 20-80% 50V 0603
2427	2238 586 59812	100nF 20-80% 50V 0603
2428	2238 586 59812	100nF 20-80% 50V 0603

2429	2238 586 59812	100nF 20-80% 50V 0603
2432	2238 586 59812	100nF 20-80% 50V 0603
2433	2238 586 59812	100nF 20-80% 50V 0603
2512	2020 021 91672	100µF 6V3 20%
2512	2020 021 91857	100µF 6V3 20%
2514	2238 586 59812	100nF 20-80% 50V 0603
2515	3198 017 44740	470nF 10V 0603
2516	2020 021 91672	100µF 6V3 20%
2516	2020 021 91857	100µF 6V3 20%
2518	2020 552 94427	100pF 5% 50v 0603
2519	2238 586 59812	100nF 20-80% 50V 0603
2521	2238 586 59812	100nF 20-80% 50V 0603
2524	2238 586 59812	100nF 20-80% 50V 0603
2525	2238 586 59812	100nF 20-80% 50V 0603
2526	2238 586 59812	100nF 20-80% 50V 0603
2527	5322 126 11583	10nF 10% 50V 0603
2701	2238 586 59812	100nF 20-80% 50V 0603
2712	2238 586 59812	100nF 20-80% 50V 0603
2726	2238 586 59812	100nF 20-80% 50V 0603
2727	2238 586 59812	100nF 20-80% 50V 0603
2728	2020 021 91729	4.7µF 20% 35V
2729	2020 021 91729	4.7µF 20% 35V
2806	2238 586 59812	100nF 20-80% 50V 0603
2807	2238 586 59812	100nF 20-80% 50V 0603
2808	2238 586 59812	100nF 20-80% 50V 0603
2809	2238 586 59812	100nF 20-80% 50V 0603
2810	2238 586 59812	100nF 20-80% 50V 0603
2811	2238 586 59812	100nF 20-80% 50V 0603
2812	2238 586 59812	100nF 20-80% 50V 0603
2820	2238 586 59812	100nF 20-80% 50V 0603
2821	2238 586 59812	100nF 20-80% 50V 0603
2822	2238 586 59812	100nF 20-80% 50V 0603
2823	2238 586 59812	100nF 20-80% 50V 0603
2824	2238 586 59812	100nF 20-80% 50V 0603
2825	2238 586 59812	100nF 20-80% 50V 0603
2826	2238 586 59812	100nF 20-80% 50V 0603
2830	2238 586 59812	100nF 20-80% 50V 0603
2832	2238 586 59812	100nF 20-80% 50V 0603
2833	2238 586 59812	100nF 20-80% 50V 0603
2900	2238 586 59812	100nF 20-80% 50V 0603
2901	2238 586 59812	100nF 20-80% 50V 0603
2902	2238 586 59812	100nF 20-80% 50V 0603
2903	2238 586 59812	100nF 20-80% 50V 0603
2904	2238 586 59812	100nF 20-80% 50V 0603
2905	2238 586 59812	100nF 20-80% 50V 0603
2906	2238 586 59812	100nF 20-80% 50V 0603
2907	2238 586 59812	100nF 20-80% 50V 0603
2908	2238 586 59812	100nF 20-80% 50V 0603
2909	2238 586 59812	100nF 20-80% 50V 0603
2910	4822 122 33761	22pF 5% 50V
2911	2238 916 15641	22nF 10% 25V 0603
2912	2238 586 59812	100nF 20-80% 50V 0603
2913	2238 586 59812	100nF 20-80% 50V 0603
2914	4822 126 14506	270pF 5% 50V 0603
2915	4822 126 14506	270pF 5% 50V 0603
2916	4822 126 14506	270pF 5% 50V 0603
2917	4822 126 14506	270pF 5% 50V 0603
2918	4822 122 33761	22pF 5% 50V
2919	4822 122 33761	22pF 5% 50V
2920	2238 586 59812	100nF 20-80% 50V 0603
2921	4822 122 33761	22pF 5% 50V
2922	4822 122 33761	22pF 5% 50V
2923	2238 586 59812	100nF 20-80% 50V 0603
2924	2238 586 59812	100nF 20-80% 50V 0603
2925	2238 586 59812	100nF 20-80% 50V 0603
2926	4822 126 14506	270pF 5% 50V 0603
2927	4822 126 14506	270pF 5% 50V 0603
2928	4822 126 14506	270pF 5% 50V 0603
2929	4822 126 14506	270pF 5% 50V 0603
2930	2238 586 59812	100nF 20-80% 50V 0603
2931	2020 021 91729	4.7µF 20% 35V
2933	2238 586 59812	100nF 20-80% 50V 0603
2934	2238 586 59812	100nF 20-80% 50V 0603
2935	4822 126 14506	270pF 5% 50V 0603
2936	4822 126 14506	270pF 5% 50V 0603
2937	4822 126 14506	270pF 5% 50V 0603
2938	2238 586 59812	100nF 20-80% 50V 0603
2939	2020 021 91729	4.7µF 20% 35V
2940	2238 586 59812	100nF 20-80% 50V 0603

3000	4822 051 30681	680Ω 5% 0.062W
3003	4822 051 30472	4.7kΩ 5% 0.062W
3004	4822 051 30681	680Ω 5% 0.062W
3005	4822 051 30101	100Ω 5% 0.062W
3006	4822 051 30222	2.2kΩ 5% 0.062W
3008	4822 051 30101	100Ω 5% 0.062W
3009	4822 051 30102	1kΩ 5% 0.062W
3010	4822 117 12139	22Ω 5% 0.062W
3011	4822 051 30103	10kΩ 5% 0.062W
3012	4822 051 30472	4.7kΩ 5% 0.062W
3013	4822 117 12917	1Ω 5% 0.062W 0603
3015	4822 051 30103	10kΩ 5% 0.062W
3016	4822 051 30103	10kΩ 5% 0.062W
3017	4822 051 30103	10kΩ 5% 0.062W
3018	4822 051 30103	10kΩ 5% 0.062W
3019	4822 051 30472	4.7kΩ 5% 0.062W
3021	4822 051 30103	10kΩ 5% 0.062W
3023	4822 051 30101	100Ω 5% 0.062W
3024	4822 051 30101	100Ω 5% 0.062W
3025	4822 051 30101	100Ω 5% 0.062W
3026	4822 051 30101	100Ω 5% 0.062W
3082	4822 117 13632	100kΩ 1% 0603 0.62W
3087	4822 051 30479	47Ω 5% 0.062W
3088	4822 117 13632	100kΩ 1% 0603 0.62W
3090	4822 051 30472	4.7kΩ 5% 0.062W
3092	4822 117 13632	100kΩ 1% 0603 0.62W
3093	4822 051 30682	6.8kΩ 5% 0.062W
3095	4822 051 30472	4.7kΩ 5% 0.062W
3096	4822 051 30472	4.7kΩ 5% 0.062W
3098	4822 117 13632	100kΩ 1% 0603 0.62W
3100	4822 051 30103	10kΩ 5% 0.062W
3101	4822 051 30339	33Ω 5% 0.062W
3103	4822 051 30339	33Ω 5% 0.062W
3106	4822 051 30339	33Ω 5% 0.062W
3108	4822 051 30339	33Ω 5% 0.062W
3110	4822 051 30339	33Ω 5% 0.062W
3112	4822 051 30339	33Ω 5% 0.062W
3113	4822 051 30103	10kΩ 5% 0.062W
3114	4822 051 30472	4.7kΩ 5% 0.062W
3116	4822 051 30339	33Ω 5% 0.062W
3117	4822 051 30472	4.7kΩ 5% 0.062W
3118	4822 051 30339	33Ω 5% 0.062W
3119	4822 051 30103	10kΩ 5% 0.062W
3120	4822 051 30339	33Ω 5% 0.062W
3122	4822 051 30339	33Ω 5% 0.062W
3124	4822 051 30339	33Ω 5% 0.062W
3126	4822 051 30339	33Ω 5% 0.062W
3128	4822 051 30339	33Ω 5% 0.062W
3130	4822 051 30339	33Ω 5% 0.062W
3132	4822 051 30101	100Ω 5% 0.062W
3133	4822 051 30339	33Ω 5% 0.062W
3135	4822 051 30339	33Ω 5% 0.062W
3137	4822 051 30101	100Ω 5% 0.062W
3138	4822 051 30339	33Ω 5% 0.062W
3142	4822 051 30101	100Ω 5% 0.062W
3143	4822 117 13501	82Ω 5% 0.62W 0603
3144	4822 051 30101	100Ω 5% 0.062W
3145	4822 051 30562	5.6kΩ 5% 0.063W 0603
3147	4822 117 12139	22Ω 5% 0.062W
3149	4822 117 12139	22Ω 5% 0.062W
3154	4822 117 13501	82Ω 5% 0.62W 0603
3156	4822 051 30102	1kΩ 5% 0.062W
3159	4822 117 12139	22Ω 5% 0.062W
3161	4822 117 13501	82Ω 5% 0.62W 0603
3162	4822 051 30472	4.7kΩ 5% 0.062W
3164	4822 051 30103	10kΩ 5% 0.062W
3167	4822 051 30339	33Ω 5% 0.062W
3168	4822 051 30472	4.7kΩ 5% 0.062W
3170	4822 051 30339	33Ω 5% 0.062W
3172	4822 051 30339	33Ω 5% 0.062W
3173	4822 051 30472	4.7kΩ 5% 0.062W
3175	4822 051 30339	33Ω 5% 0.062W
3178	4822 051 30339	33Ω 5% 0.062W
3184	4822 051 30472	4.7kΩ 5% 0.062W
3185	4822 051 30101	100Ω 5% 0.062W
3186	4822 051 30103	10kΩ 5% 0.062W
3187	4822 051 30472	4.7kΩ 5% 0.062W
3189	4822 051 30103	10kΩ 5% 0.062W
3191	4822 117 13632	100kΩ 1% 0603 0.62W
3192	4822 051 30682	6.8kΩ 5% 0.062W
3195	4822 117 13632	100kΩ 1% 0603 0.62W
3197	4822 051 30101	100Ω 5% 0.062W
3199	4822 051 30103	10kΩ 5% 0.062W
3200	4822 051 30103	10kΩ 5% 0.062W
3202	4822 051 30101	100Ω 5% 0.062W
3202	4822 051 30221	220Ω 5% 0.062W
3204	4822 051 30103	10kΩ 5% 0.062W
3205	2322 704 66342	6.34kΩ 0603 RC22H 1%
3210	4822 051 30339	33Ω 5% 0.062W
3211	4822 051 30339	33Ω 5% 0.062W
3212	2322 734 65609	56Ω 1% 0.125W 0805
3213	2322 734 65609	56Ω 1% 0.125W 0805
3214	4822 051 30339	33Ω 5% 0.062W
3215	4822 051 30339	33Ω 5% 0.062W
3216	4822 051 30109	10Ω 5% 0.062W
3217	4822 051 30339	33Ω 5% 0.062W
3218	4822 051 30339	33Ω 5% 0.062W
3219	4822 051 30103	10kΩ 5% 0.062W
3220	4822 051 30109	10Ω 5% 0.062W
3221	4822 051 30339	33Ω 5% 0.062W
3222	4822 051 30339	33Ω 5% 0.062W
3223	4822 051 30109	10Ω 5% 0.062W
3224	4822 117 13501	82Ω 5% 0.62W 0603
3225	4822 051 30109	10Ω 5% 0.062W
3226	4822 051 30339	33Ω 5% 0.062W
3227	4822 051 30339	33Ω 5% 0.062W
3228	4822 051 30109	10Ω 5% 0.062W
3229	4822 051 30339	33Ω 5% 0.062W
3230	4822 051 30103	10kΩ 5% 0.062W
3231	4822 051 30109	10Ω 5% 0.062W
3232	2322 734 65609	56Ω 1% 0.125W 0805
3233	2322 734 65609	56Ω 1% 0.125W 0805
3234	4822 051 30109	10Ω 5% 0.062W
3235	4822 051 30103	10kΩ 5% 0.062W
3236	4822 051 30109	10Ω 5% 0.062W
3237	4822 051 30339	33Ω 5% 0.062W
3238	4822 051 30109	10Ω 5% 0.062W
3239	4822 051 30339	33Ω 5% 0.062W
3240	2322 704 65102	5.1kΩ 1% 0603
3241	4822 051 30339	33Ω 5% 0.062W
3242	4822 051 30109	10Ω 5% 0.062W
3243	4822 051 30339	33Ω 5% 0.062W
3244	4822 051 30339	33Ω 5% 0.062W
3245	4822 051 30109	10Ω 5% 0.062W
3246	4822 051 30339	33Ω 5% 0.062W
3247	4822 051 30339	33Ω 5% 0.062W
3248	4822 051 30109	10Ω 5% 0.062W
3248	4822 117 12139	22Ω 5% 0.062W
3249	4822 051 30339	33Ω 5% 0.062W
3250	4822 051 30472	4.7kΩ 5% 0.062W
3251	4822 051 30339	33Ω 5% 0.062W
3252	4822 051 30339	33Ω 5% 0.062W
3253	4822 117 12917	1Ω 5% 0.062W 0603
3254	4822 051 30339	33Ω 5% 0.062W
3255	4822 051 30472	4.7kΩ 5% 0.062W
3256	4822 051 30472	4.7kΩ 5% 0.062W
3257	4822 051 30223	22kΩ 5% 0.062W
3258	4822 051 30223	22kΩ 5% 0.062W
3259	4822 051 30472	4.7kΩ 5% 0.062W
3260	4822 051 30101	100Ω 5% 0.062W
3260	4822 051 30221	220Ω 5% 0.062W
3261	4822 117 12917	1Ω 5% 0.062W 0603
3262	4822 051 30472	4.7kΩ 5% 0.062W
3263	4822 051 30472	4.7kΩ 5% 0.062W
3264	4822 051 30472	4.7kΩ 5% 0.062W
3265	4822 051 30472	4.7kΩ 5% 0.062W
3266	4822 051 30472	4.7kΩ 5% 0.062W
3267	4822 051 30472	4.7kΩ 5% 0.062W
3268	4822 051 30472	4.7kΩ 5% 0.062W
3269	4822 051 30472	4.7kΩ 5% 0.062W
3270	4822 051 30101	100Ω 5% 0.062W
3270	4822 051 30221	220Ω 5% 0.062W
3271	4822 051 30101	100Ω 5% 0.062W
3271	4822 051 30221	220Ω 5% 0.062W
3272	4822 051 30101	100Ω 5% 0.062W
3272	4822 051 30221	220Ω 5% 0.062W
3273	4822 051 30339	33Ω 5% 0.062W
3274	4822 051 30101	100Ω 5% 0.062W
3274	4822 051 30221	220Ω 5% 0.062W
3276	4822 051 30102	1kΩ 5% 0.062W
3277	4822 051 30101	100Ω 5% 0.062W
3277	4822 051 30221	220Ω 5% 0.062W
3278	4822 051 30101	100Ω 5% 0.062W
3278	4822 051 30221	220Ω 5% 0.062W
3279	4822 051 30101	100Ω 5% 0.062W
3279	4822 051 30221	220Ω 5% 0.062W
3280	4822 051 30103	10kΩ 5% 0.062W
3281	4822 051 30103	10kΩ 5% 0.062W
3282	4822 051 30103	10kΩ 5% 0.062W
3285	4822 051 30109	10Ω 5% 0.062W
3287	4822 051 30472	4.7kΩ 5% 0.062W
3289	4822 051 30472	4.7kΩ 5% 0.062W
3290	4822 051 30472	4.7kΩ 5% 0.062W
3292	4822 051 30472	4.7kΩ 5% 0.062W
3294	4822 051 30101	100Ω 5% 0.062W
3294	4822 051 30221	220Ω 5% 0.062W
3295	4822 051 30101	100Ω 5% 0.062W
3295	4822 051 30221	220Ω 5% 0.062W
3296	4822 051 30101	100Ω 5% 0.062W
3296	4822 051 30221	220Ω 5% 0.062W
3297	4822 051 30101	100Ω 5% 0.062W
3297	4822 051 30221	220Ω 5% 0.062W
3298	4822 051 30101	100Ω 5% 0.062W
3298	4822 051 30221	220Ω 5% 0.062W
3299	4822 051 30101	100Ω 5% 0.062W
3299	4822 051 30221	220Ω 5% 0.062W
3307	4822 051 30103	10kΩ 5% 0.062W
3311	4822 051 30103	10kΩ 5% 0.062W
3315	4822 051 30101	100Ω 5% 0.062W
3315	4822 051 30221	220Ω 5% 0.062W
3316	4822 051 30101	100Ω 5% 0.062W
3316	4822 051 30221	220Ω 5% 0.062W
3317	4822 051 30101	100Ω 5% 0.062W
3317	4822 051 30221	220Ω 5% 0.062W
3318	4822 051 30101	100Ω 5% 0.062W
3318	4822 051 30221	220Ω 5% 0.062W
3319	4822 051 30101	100Ω 5% 0.062W
3319	4822 051 30221	220Ω 5% 0.062W
3320	4822 051 30103	10kΩ 5% 0.062W

3400	4822 051 30472	4.7kΩ 5% 0.062W
3401	4822 051 30472	4.7kΩ 5% 0.062W
3402	4822 051 30472	4.7kΩ 5% 0.062W
3403	4822 051 30472	4.7kΩ 5% 0.062W
3404	4822 051 30472	4.7kΩ 5% 0.062W
3405	4822 051 30332	3.3kΩ 5% 0.062W
3406	4822 051 30332	3.3kΩ 5% 0.062W
3407	4822 051 30332	3.3kΩ 5% 0.062W
3408	4822 051 30332	3.3kΩ 5% 0.062W
3409	4822 051 30472	4.7kΩ 5% 0.062W
3410	4822 051 30472	4.7kΩ 5% 0.062W
3411	4822 051 30472	4.7kΩ 5% 0.062W
3412	4822 051 30472	4.7kΩ 5% 0.062W
3413	4822 051 30472	4.7kΩ 5% 0.062W
3414	4822 051 30472	4.7kΩ 5% 0.062W
3415	4822 051 30472	4.7kΩ 5% 0.062W
3416	4822 051 30472	4.7kΩ 5% 0.062W
3417	4822 051 30472	4.7kΩ 5% 0.062W
3418	4822 051 30472	4.7kΩ 5% 0.062W
3419	4822 051 30472	4.7kΩ 5% 0.062W
3420	4822 051 30472	4.7kΩ 5% 0.062W
3421	4822 051 30472	4.7kΩ 5% 0.062W
3422	4822 051 30472	4.7kΩ 5% 0.062W
3423	4822 051 30472	4.7kΩ 5% 0.062W
3424	4822 051 30103	10kΩ 5% 0.062W
3425	4822 051 30103	10kΩ 5% 0.062W
3426	4822 051 30103	10kΩ 5% 0.062W
3427	4822 051 30103	10kΩ 5% 0.062W
3428	4822 051 30103	10kΩ 5% 0.062W
3429	4822 051 30339	33Ω 5% 0.062W
3430	4822 051 30339	33Ω 5% 0.062W
3431	4822 051 30339	33Ω 5% 0.062W
3432	4822 051 30339	33Ω 5% 0.062W
3433	5322 117 13036	1.2kΩ 1% 0.063W 0603
3434	4822 117 12971	15Ω 5% 0.62W 0603
3435	4822 117 12971	15Ω 5% 0.62W 0603
3436	4822 051 30339	33Ω 5% 0.062W
3437	4822 051 30339	33Ω 5% 0.062W
3438	4822 051 30339	33Ω 5% 0.062W
3439	4822 051 30339	33Ω 5% 0.062W
3440	4822 051 30339	33Ω 5% 0.062W
3442	4822 117 12139	22Ω 5% 0.062W
3443	4822 117 12139	22Ω 5% 0.062W
3444	4822 117 12139	22Ω 5% 0.062W
3445	4822 117 12139	22Ω 5% 0.062W
3446	4822 117 12139	22Ω 5% 0.062W
3447	4822 117 12139	22Ω 5% 0.062W
3448	4822 117 12139	22Ω 5% 0.062W
3449	4822 117 12139	22Ω 5% 0.062W
3450	4822 117 12139	22Ω 5% 0.062W
3451	4822 117 12139	22Ω 5% 0.062W
3452	4822 117 12139	22Ω 5% 0.062W
3453	4822 117 12139	22Ω 5% 0.062W
3454	4822 117 12139	22Ω 5% 0.062W
3455	4822 117 12139	22Ω 5% 0.062W
3456	4822 117 12139	22Ω 5% 0.062W
3457	4822 117 12139	22Ω 5% 0.062W
3458	4822 117 12139	22Ω 5% 0.062W
3459	4822 117 12139	22Ω 5% 0.062W
3460	4822 117 12139	22Ω 5% 0.062W
3461	4822 117 12139	22Ω 5% 0.062W
3462	4822 117 12139	22Ω 5% 0.062W
3463	4822 117 12139	22Ω 5% 0.062W
3464	4822 117 12139	22Ω 5% 0.062W
3465	4822 117 12139	22Ω 5% 0.062W
3466	4822 117 12139	22Ω 5% 0.062W
3467	4822 117 12139	22Ω 5% 0.062W
3468	4822 117 12139	22Ω 5% 0.062W
3469	4822 117 12139	22Ω 5% 0.062W
3470	4822 117 12139	22Ω 5% 0.062W
3471	4822 117 12139	22Ω 5% 0.062W
3472	4822 117 12139	22Ω 5% 0.062W
3473	4822 117 12139	22Ω 5% 0.062W
3474	4822 117 12139	22Ω 5% 0.062W
3475	4822 117 12139	22Ω 5% 0.062W
3476	4822 117 12139	22Ω 5% 0.062W
3477	4822 117 12139	22Ω 5% 0.062W
3478	4822 117 12139	22Ω 5% 0.062W
3479	4822 117 12139	22Ω 5% 0.062W
3480	4822 117 12139	22Ω 5% 0.062W
3481	4822 117 12139	22Ω 5% 0.062W
3482	4822 117 12139	22Ω 5% 0.062W
3483	4822 117 12139	22Ω 5% 0.062W
3484	4822 117 12139	22Ω 5% 0.062W
3485	4822 117 12139	22Ω 5% 0.062W
3486	4822 117 12139	22Ω 5% 0.062W
3487	4822 117 12139	22Ω 5% 0.062W
3488	4822 117 12139	22Ω 5% 0.062W
3489	4822 117 12139	22Ω 5% 0.062W
3490	4822 117 12139	22Ω 5% 0.062W
3491	4822 117 12139	22Ω 5% 0.062W
3492	4822 117 12139	22Ω 5% 0.062W
3493	4822 117 12139	22Ω 5% 0.062W
3494	4822 117 12139	22Ω 5% 0.062W
3495	4822 117 12139	22Ω 5% 0.062W
3496	4822 051 30339	33Ω 5% 0.062W
3497	4822 117 13632	100kΩ 1% 0603 0.62W
3498	4822 051 30103	10kΩ 5% 0.062W
3499	4822 051 30103	10kΩ 5% 0.062W
3503	5322 117 13034	1.5kΩ 1% 0.063W 0603
3504	2322 704 61302	1k3 1% 0.063W 0603
3504	2322 704 61402	1.4kΩ 0603 RC22H PM1
3703	4822 051 30759	75Ω 5% 0.062W
3706	2322 704 61002	1kΩ 0603 RC22H PM1
3706	5322 117 13018	1kΩ 1% 0.063W 0603
3707	2322 704 61002	1kΩ 0603 RC22H PM1
3707	5322 117 13018	1kΩ 1% 0.063W 0603
3710	4822 051 30759	75Ω 5% 0.062W
3714	2322 704 61002	1kΩ 0603 RC22H PM1
3714	5322 117 13018	1kΩ 1% 0.063W 0603
3716	2322 704 61002	1kΩ 0603 RC22H PM1
3716	5322 117 13018	1kΩ 1% 0.063W 0603
3718	4822 051 30759	75Ω 5% 0.062W
3723	2322 704 61002	1kΩ 0603 RC22H PM1
3723	5322 117 13018	1kΩ 1% 0.063W 0603
3724	2322 704 61002	1kΩ 0603 RC22H PM1
3724	5322 117 13018	1kΩ 1% 0.063W 0603
3805	4822 051 30101	100Ω 5% 0.062W
3806	4822 051 30101	100Ω 5% 0.062W
3807	4822 051 30101	100Ω 5% 0.062W
3808	4822 051 30472	4.7kΩ 5% 0.062W
3809	4822 051 30103	10kΩ 5% 0.062W
3810	4822 051 30103	10kΩ 5% 0.062W
3811	4822 051 30103	10kΩ 5% 0.062W
3812	4822 051 30103	10kΩ 5% 0.062W
3813	4822 051 30103	10kΩ 5% 0.062W
3814	4822 051 30103	10kΩ 5% 0.062W
3815	4822 051 30103	10kΩ 5% 0.062W
3817	4822 051 30472	4.7kΩ 5% 0.062W
3820	4822 051 30472	4.7kΩ 5% 0.062W
3821	4822 051 30472	4.7kΩ 5% 0.062W
3822	4822 051 30472	4.7kΩ 5% 0.062W
3825	4822 051 30472	4.7kΩ 5% 0.062W
3826	4822 051 30472	4.7kΩ 5% 0.062W
3827	4822 051 30472	4.7kΩ 5% 0.062W
3831	4822 051 30472	4.7kΩ 5% 0.062W
3832	4822 051 30472	4.7kΩ 5% 0.062W
3836	4822 051 30101	100Ω 5% 0.062W
3837	4822 051 30103	10kΩ 5% 0.062W
3838	4822 051 30103	10kΩ 5% 0.062W
3839	4822 051 30103	10kΩ 5% 0.062W
3840	4822 051 30103	10kΩ 5% 0.062W
3849	4822 051 30103	10kΩ 5% 0.062W
3850	4822 051 30103	10kΩ 5% 0.062W
3851	4822 051 30103	10kΩ 5% 0.062W
3852	4822 051 30103	10kΩ 5% 0.062W
3854	4822 051 30222	2.2kΩ 5% 0.062W
3855	4822 051 30223	22kΩ 5% 0.062W
3901	2322 704 61801	180Ω 0603 RC22H PM1
3901	5322 117 13061	180Ω 1% 0.063W 0603
3902	5322 117 13059	560Ω 1% 0.063W 0603
3905	2322 704 61801	180Ω 0603 RC22H PM1
3905	5322 117 13061	180Ω 1% 0.063W 0603
3906	5322 117 13059	560Ω 1% 0.063W 0603
3907	4822 051 30101	100Ω 5% 0.062W
3908	4822 051 30181	180Ω 5% 0.062W
3909	4822 051 30689	68Ω 5% 0.063W 0603
3910	4822 051 30689	68Ω 5% 0.063W 0603
3911	4822 051 30561	560Ω 5% 0.062W
3912	4822 051 30222	2.2kΩ 5% 0.062W
3913	4822 117 12139	22Ω 5% 0.062W
3914	4822 051 30689	68Ω 5% 0.063W 0603
3915	4822 051 30472	4.7kΩ 5% 0.062W
3916	4822 051 30479	47Ω 5% 0.062W
3917	4822 051 30479	47Ω 5% 0.062W
3918	5322 117 13055	75R 1% 0.063W 0603
3919	4822 051 30102	1kΩ 5% 0.062W
3920	5322 117 13055	75R 1% 0.063W 0603
3921	4822 051 30102	1kΩ 5% 0.062W
3922	4822 051 30689	68Ω 5% 0.063W 0603
3923	4822 051 30223	22kΩ 5% 0.062W
3924	5322 117 13055	75R 1% 0.063W 0603
3925	4822 051 30103	10kΩ 5% 0.062W
3926	4822 051 30102	1kΩ 5% 0.062W
3927	5322 117 13055	75R 1% 0.063W 0603
3928	4822 051 30102	1kΩ 5% 0.062W
3929	2322 704 65609	56Ω 0603 RC22H 1%
3930	5322 117 13055	75R 1% 0.063W 0603
3931	4822 051 30102	1kΩ 5% 0.062W
3932	5322 117 13055	75R 1% 0.063W 0603
3933	4822 051 30102	1kΩ 5% 0.062W
3934	5322 117 13055	75R 1% 0.063W 0603
3935	5322 117 13055	75R 1% 0.063W 0603
3936	5322 117 13055	75R 1% 0.063W 0603
3937	5322 117 13055	75R 1% 0.063W 0603
3938	5322 117 13055	75R 1% 0.063W 0603
3939	5322 117 13055	75R 1% 0.063W 0603
3941	2322 704 87501	750Ω 603 RC22H 1%
3942	5322 117 13034	1.5kΩ 1% 0.063W 0603
3943	5322 117 13053	6.8kΩ 1% 0.063W 0603
3944	5322 117 13031	5.6kΩ 1% 0603
3945	5322 117 13026	4.7kΩ 1% 0.063W 0603
3946	2322 704 61002	1kΩ 0603 RC22H PM1
3946	5322 117 13018	1kΩ 1% 0.063W 0603
3947	5322 117 13026	4.7kΩ 1% 0.063W 0603
3948	2322 704 87501	750Ω 603 RC22H 1%
3949	5322 117 13034	1.5kΩ 1% 0.063W 0603
3950	5322 117 13034	1.5kΩ 1% 0.063W 0603
3951	5322 117 13034	1.5kΩ 1% 0.063W 0603
3952	5322 117 13036	1.2kΩ 1% 0.063W 0603
3953	5322 117 13026	4.7kΩ 1% 0.063W 0603
3954	2322 704 61002	1kΩ 0603 RC22H PM1
3954	5322 117 13018	1kΩ 1% 0.063W 0603
3955	4822 117 12917	1Ω 5% 0.062W 0603
4001	4822 051 30008	Jumper 0603
4005	4822 051 30008	Jumper 0603
4111	4822 051 30008	Jumper 0603
4113	4822 051 30008	Jumper 0603
4115	4822 051 30008	Jumper 0603
4117	4822 051 30008	Jumper 0603
4123	4822 051 30008	Jumper 0603
4201	4822 051 30008	Jumper 0603
4202	4822 051 30008	Jumper 0603
4204	4822 051 30008	Jumper 0603
4205	4822 051 30008	Jumper 0603
4308	4822 051 30008	Jumper 0603
4311	4822 051 30008	Jumper 0603
4315	4822 051 30008	Jumper 0603
4316	4822 051 30008	Jumper 0603
4401	4822 051 30008	Jumper 0603
4402	4822 051 30008	Jumper 0603
4404	4822 051 30008	Jumper 0603
4406	4822 051 30008	Jumper 0603
4407	4822 051 30008	Jumper 0603
4701	4822 051 30008	Jumper 0603
4702	4822 051 30008	Jumper 0603
4703	4822 051 30008	Jumper 0603
4800	4822 051 30008	Jumper 0603
4803	4822 051 30008	Jumper 0603
4815	4822 051 30008	Jumper 0603
4816	4822 051 30008	Jumper 0603
4822	4822 051 30008	Jumper 0603
4900	4822 051 30008	Jumper 0603
4901	4822 051 30008	Jumper 0603
4904	4822 051 30008	Jumper 0603
4906	4822 051 30008	Jumper 0603
4910	4822 051 30008	Jumper 0603

5001	4822 157 11499	BLM11P600SPT
5005	4822 157 11499	BLM11P600SPT
5008	4822 157 11499	BLM11P600SPT
5009	4822 157 11499	BLM11P600SPT
5010	4822 157 11499	BLM11P600SPT
5100	4822 157 11499	BLM11P600SPT
5102	4822 157 11499	BLM11P600SPT
5103	4822 157 11499	BLM11P600SPT
5104	4822 157 11499	BLM11P600SPT
5200	4822 157 11499	BLM11P600SPT
5202	4822 157 11499	BLM11P600SPT
5203	4822 157 11499	BLM11P600SPT
5204	4822 157 11499	BLM11P600SPT
5302	4822 157 11499	BLM11P600SPT
5400	4822 157 11499	BLM11P600SPT
5401	4822 157 11717	BLM31P500SPT
5402	4822 157 11717	BLM31P500SPT
5403	4822 157 11499	BLM11P600SPT
5404	4822 157 11499	BLM11P600SPT
5405	4822 157 11717	BLM31P500SPT
5406	4822 157 11717	BLM31P500SPT
5501	4822 157 11717	BLM31P500SPT
5502	4822 157 11499	BLM11P600SPT
5503	2422 535 94995	10µH 1014520%
5711	4822 157 70649	4,7µH (NL322522T-4R7J)
5712	4822 157 70649	4,7µH (NL322522T-4R7J)
5802	4822 157 11499	BLM11P600SPT
5803	4822 157 11499	BLM11P600SPT
5804	4822 157 11499	BLM11P600SPT
5808	4822 157 11499	BLM11P600SPT
5809	4822 157 11499	BLM11P600SPT
5901	4822 157 11499	BLM11P600SPT
5902	4822 157 70649	4,7µH (NL322522T-4R7J)
5903	4822 157 70649	4,7µH (NL322522T-4R7J)
5904	3198 018 90050	Bead 1kΩ at 100MHz
5905	2422 549 45634	0603 EMI 100MHZ 60R
5906	2422 549 45634	0603 EMI 100MHZ 60R
5907	2422 536 00598	1.5µH 1210 20%
5908	2422 536 00598	1.5µH 1210 20%
5909	2422 549 45634	0603 EMI 100MHZ 60R
5910	2422 536 00598	1.5µH 1210 20%

5911	2422 536 00598	1.5µH 1210 20%
5912	2422 536 00598	1.5µH 1210 20%
5913	2422 536 00598	1.5µH 1210 20%
5914	2422 549 45634	0603 EMI 100MHZ 60R
5915	2422 549 45634	0603 EMI 100MHZ 60R
5916	4822 157 11499	BLM11P600SPT

6000	4822 130 11528	1PS76SB10
6100	4822 130 11528	1PS76SB10
6101	4822 130 11528	1PS76SB10

7001	9322 116 74668	LD1117D33
7002	9352 683 81115	74LVC1G32GW
7003	5322 130 60159	BC846B
7004	9352 673 95518	SAA7118E/V1
7103	9352 683 81115	74LVC1G32GW
7104	9352 500 20118	74LVC08AD
7106	9322 191 99685	NCP303LSN29
7107	9352 500 20118	74LVC08AD
7111	5322 209 71568	PC74HCT14T
7200	9352 683 02157	PDI1394P25BD
7201	9352 682 52557	PDI1394L40
7300	9352 317 00118	74LVC125AD
7400	9352 725 55557	PNX7100EH/C1 only for Board E4!
7400	9352 730 27557	PNX7100EH/C2 only for Board E4Plus!
7401	9352 115 40118	74LVC245APW
7402	2722 171 08819	4MHZ 15P FXO34FL
7500	9322 188 69668	STS5DNF20V
7501	9322 188 68668	NCP1570D
7701	9322 167 49685	AD8061ART
7702	9322 169 89668	AD8062AR
7807	9965 000 21567	AM29DL640G-70EI/I-STEP
7809	9322 130 41668	M24C64-WMN6
7810	9965 000 18099	M24C64-WMN6/CHR BOOT1.0
7812	9322 187 09668	MT48LC16M16A2TG-7E
7813	9322 187 09668	MT48LC16M16A2TG-7E
7900	9352 684 56115	74LVC1G04GW
7901	9352 684 56115	74LVC1G04GW
7902	4822 130 61553	DTC124EU
7903	9352 456 80115	74HCT1G125GW
7904	5322 130 60159	BC846B
7905	4822 130 61553	DTC124EU
7906	5322 130 60159	BC846B
7907	5322 130 60159	BC846B
7908	5322 130 60159	BC846B
7909	5322 130 60159	BC846B
7910	9322 169 89668	AD8062AR
7911	5322 130 60159	BC846B
7912	5322 130 60159	BC846B